

Effective Information Centers

Recent Titles from Quorum Books

A Guide to Hazardous Materials Management: Physical Characteristics,
Federal Regulations, and Response Alternatives

Aileen Schumacher

Forecasting Sales with the Personal Computer: Guidelines for Marketing and
Sales Managers

Dick Berry

Entrepreneurship and Public Policy: Can Government Stimulate Business
Startups?

Benjamin W. Mokry

Handbook of the Money and Capital Markets

Alan Gart

Envisionary Management: A Guide for Human Resource Professionals in
Management Training and Development

William P. Anthony, E. Nick Maddox, and Walter Wheatley, Jr.

Marketing Real Estate Internationally

M. A. Hines

Advertising Self-Regulation and Outside Participation: A Multinational
Comparison

J. J. Boddewyn

The New Environment in International Accounting: Issues and Practices

Ahmed Belkaoui

Legal Structure of International Textile Trade

Henry R. Zheng

Accounting for Data Processing Costs

Robert W. McGee

The Management of Corporate Business Units: Portfolio Strategies
for Turbulent Times

Louis E. V. Nevaer and Steven A. Deck

How to Write for the Professional Journals: A Guide for Technically
Trained Managers

Ryle L. Miller, Jr.

Effective Information Centers

GUIDELINES FOR MIS AND IC MANAGERS

Robert J. Thierauf

Q QUORUM BOOKS
NEW YORK • WESTPORT, CONNECTICUT • LONDON

655435
T432

Library of Congress Cataloging-in-Publication Data

Thierauf, Robert J.

Effective information centers : guidelines for MIS and IC managers

Robert J. Thierauf.

p. cm.

Includes index.

ISBN 0-89930-308-0 (lib. bdg. : alk. paper)

1. Management information systems. 2. Information services.

I. Title.

T58.6.T458 1988

658.4'038--dc19

87-32602

British Library Cataloguing in Publication Data is available.

Copyright © 1988 by Robert J. Thierauf

All rights reserved. No portion of this book may be reproduced, by any process or technique, without the express written consent of the publisher.

Library of Congress Catalog Card Number: 87-32602

ISBN: 0-89930-308-0

First published in 1988 by Quorum Books

Greenwood Press, Inc.

88 Post Road West, Westport, Connecticut 06881

Printed in the United States of America



7/88

The paper used in this book complies with the Permanent Paper Standard issued by the National Information Standards Organization (Z39.48-1984).

10 9 8 7 6 5 4 3 2 1

CONTENTS

FIGURES	vii
PREFACE	xi
ABBREVIATIONS	xv
PART I Introduction to Effective Information Centers	
1. <i>Getting Started on Effective Information Centers</i>	3
PART II Planning for Effective Information Centers	
2. <i>Planning an Overall Strategy for Information Centers</i>	23
3. <i>Planning for Hardware and Software Integration</i>	59
PART III Organization for Effective Information Centers	
4. <i>Organization of Information Centers</i>	89
5. <i>Staffing of Information Centers</i>	113
6. <i>Training of End Users Using Information Centers</i>	139
PART IV Control over Effective Information Centers	
7. <i>Control and Security over Information Centers</i>	165

PART V Management Guidelines for Effective Information Centers

8. <i>Management Guidelines to Integrate Interests of IC Professionals and End Users</i>	191
9. <i>Management Guidelines for Information Center Professionals</i>	215
10. <i>Management Guidelines for End Users</i>	237
INDEX	257

FIGURES

2-1	Factors Helpful in Planning an Overall Strategy for Information Centers	32
2-2	Typical Computer Conflict Problems As Perceived by IC Professionals	36
2-3	Typical Computer Conflict Problems As Perceived by End Users	39
2-4	Sample Cost Projection for a New Information Center Stated on an Annual Basis	41
2-5	Major Parts and Sections of the Information Center Questionnaire	43
2-6	Part I of the IC Questionnaire—Planning an Overall Strategy for Information Centers	45
2-7	Explanations for the “No” Answers in Part I of the IC Questionnaire—Planning an Overall Strategy for Information Centers (see Figure 2-6)	51
2-8	Top-Down Approach to the Overall Planning Process Depicting Relationship among Corporate, MIS, and IC Management	53
3-1	Typical Guidelines for Consideration in a Broad-Based Microcomputer Policy by Information Centers to Assist End Users	65
3-2	Typical Guidelines for Consideration in a Broad-Based Micro Software Approach by Information Centers to Assist End Users	69

3-3	Other Guidelines for Consideration in a Broad-Based Approach to the Planning of Micro Hardware and Software by Information Centers to Assist End Users	70
3-4	Part II of the IC Questionnaire—Hardware and Software Integration	72
3-5	Major Problems Related to Hardware and Software Planning for the ABC Corporation	77
3-6	Explanations for the “No” Answers in Part II of the IC Questionnaire—Hardware and Software Integration (see Figure 3-4)	78
4-1	Information Center for a Small Organization	98
4-2	Information Center for a Medium Organization	99
4-3	Information Center for a Large Organization	99
4-4	Part III of the IC Questionnaire—Organization of Information Centers	104
4-5	Explanations for the “No” Answers in Part III of the IC Questionnaire—Organization of Information Centers (see Figure 4-4)	108
5-1	Lewin-Schein Model	122
5-2	Part IV of the IC Questionnaire—Staffing of Information Centers	127
5-3	Explanations for the “No” Answers in Part IV of the IC Questionnaire—Staffing of Information Centers (see Figure 5-2)	132
6-1	Guidelines for Selecting CBT Software	142
6-2	Steps in the Development of an Effective In-House Training Program Using Information Centers	147
6-3	Part V of the IC Questionnaire—Training of End Users	154
6-4	Explanations for the “No” Answers in Part V of the IC Questionnaire—Training of End Users (see Figure 6-3)	158
7-1	IC Management Guidelines to Improve Control over End User Computing via Information Centers	174
7-2	Part VI of the IC Questionnaire—Control and Security over Information Centers	178
7-3	Explanations for the “No” Answers in Part VI of the IC Questionnaire—Control and Security over Information Centers (see Figure 7-2)	182
8-1	Excerpts from a Microcomputer Policy for Conferring with the Information Center	196
8-2	Typical Microcomputer Acquisition Procedure	197
8-3	Typical Vendor Checklist, Approved by Corporate Management, for Assisting End Users in Negotiating with Vendors	203

8-4	Checklist for Assuring Adequate Control over Microcomputers	208
9-1	Items to Investigate for a Third-Party Microcomputer Maintenance Contract	228
9-2	Recommendations to Assist IC Professionals to Act As Facilitators in a Typical Organization	229
10-1	Reasons for End Users Turning to Packaged Applications	247

PREFACE

The main thrust of this text concerns the managerial aspects of an information center, that is, what constitutes an effectively run information center (IC)? What, exactly, is an information center? Currently, it is defined as a place where end users in an organization go to obtain information primarily about microcomputer hardware and software. The accent is on placing this new information technology—spreadsheets, query languages, report writers, decision support systems (DSS) programs, graphics, personal computing, word processing, and more—in the hands of end users. This requires information system professionals, i.e., IC professionals, who understand this information technology and can train end users how to use it.

Due to the growing importance of information centers, the text is designed to assist management information system (MIS) managers and IC managers to manage this important area better. This is particularly important now as well as in the future. As several noted computer experts have stated, half of all computing activities in the 1990s will be performed by end users. Thus, it behooves MIS and IC managers to plan, organize, and control this area as effectively as possible. This text is designed to assist them to do just that.

In the process of providing expanded computing capabilities to end users, the chief executive officer of a typical organization has to commit from several hundred thousand to several million dollars annually to support the information centers. When providing this support for users, computer professionals feel that their territory is being infringed upon. For example, a system-support manager sees his or her hard-earned territory threatened, or a COBOL programmer feels he or she is part of an en-

dangered species. In view of the foregoing difficulties, the book is also designed to assist corporate management and their staffs in taking the proper direction to bring computer professionals and end users together. In this way, the computer conflict that has arisen over time can be overcome or, at least, reduced to a tolerable level.

Additionally, the text is useful in terms of the complete information center questionnaire provided to diagnose the degree of control over information centers. This questionnaire does not give answers, but simply asks questions. However, a thorough evaluation of the "no" answers provides a basis for synthesizing the problems of the information center. In turn, appropriate recommendations can be made to rectify the problems encountered by the information center. To illustrate this six-part questionnaire, it is applied to the ABC Corporation—a typical business organization.

From a managerial perspective, a logical framework for effective information centers is followed. Chapter 1 focuses initially on the essentials of current information centers. A background on current management information systems is presented and related to information centers. A master case study of a typical business organization (i.e., the ABC Corporation) is set forth for use in the text. Also, all of the preceding is related to computer conflict that has arisen due to the introduction of information centers.

In Chapter 2, the planning of an overall strategy for developing and maintaining information centers is set forth, followed by a discussion of a strategy to resolve or, at least, reduce computer conflict as perceived by IC professionals and end users. In order to determine the effectiveness of information centers or lack thereof, Part I of the IC questionnaire is developed, which is related to planning an overall strategy for the centers. Chapter 3 builds upon the prior material by centering on the planning of micro hardware and software primarily and its integration within a typical business organization. From this perspective, Part II of the IC questionnaire is developed. For both chapters, the ABC Corporation is related to the planning function of its information centers.

As a starting point, Chapter 4 looks at the organizational roles that IC professionals can take to assist end users as well as typical organization models of information centers. Part III of the IC questionnaire is useful as an evaluation tool in terms of the IC's structure. Chapter 5 is concerned with the proper staffing of the information centers. Initially, the environment (i.e., the corporate culture) in which the information centers must operate is explored; profiles of IC professionals and end users follow. Part IV of the IC questionnaire evaluates the staffing process. Chapter 6 looks not only at the relevance of training for end users, but also the approaches to information center training. Next, the development of an effective in-house IC training program is detailed. All of these materials provide the necessary background for Part V of the IC questionnaire. In all chapters, the ABC Corporation is linked to the organization function of its information centers.

In Chapter 7, linkage of IC plans and structure is first related to control. Not only are control and related security problems for information centers addressed, but also their cost justification is examined. Part VI of the IC questionnaire (the final part) is set forth as an evaluation tool for determining the degree of control. As with the prior chapters, continuing developments of the ABC Corporation are presented.

Due to the importance of resolving or, at least, reducing computer conflict, Chapter 8 examines this critical issue and offers appropriate managerial guidelines. In a similar manner, Chapters 9 and 10 offer constructive guidelines for management to follow for overseeing IC professionals and end users, respectively.

For a project of this magnitude, I wish to thank Mr. Thomas Gannon for his overall direction and comments on the entire project. Second, I would like to thank those individuals who reviewed the original manuscript: Professor Thomas Clark of Xavier University and Mr. J. Michael Thierauf of General Electric (Evendale). Third, a special note of thanks is in order for all those who published materials that were helpful to me in developing the manuscript. Their names and their articles and books are listed in the selected references of the text.

ABBREVIATIONS

CBT	computer based training
CPA	certified public accountant
CPU	central processing unit
CRT	cathode ray tube
CSF	critical success factors
DBMS	database management system
DDP	distributed data processing
DP	data processing
DSS	decision support system
EPS	evaluation and planning system
IC	information center
MBA	master of business administration
MBO	management by objective
MIS	management information system
PC	personal computer
PCM	plug-compatible mainframe
SAS	statistical analysis system
SIG	special interest group

Part I

Introduction to Effective Information Centers

1

GETTING STARTED ON EFFECTIVE INFORMATION CENTERS

ISSUES RAISED AND EXPLORED

- To examine the nature and direction of current information centers.
- To explore the relationship between current management information systems and information centers.
- To examine typical applications which are viable candidates for information centers.
- To set the stage for computer conflict between IC professionals and end users, which will be discussed where appropriate in the text.
- To introduce a master case study, i.e., the ABC Corporation, which typifies the current state of information centers.

OUTLINE

Introduction to Effective Information Centers

Information—A Corporate Asset

New Ways to Use the Corporate Asset

An Overview of Information Centers

Nature and Direction of Current Information Centers

Typical Examples of Current Information Centers

Relationship of Information Centers to Management Information Systems

Applications That Should Be Viable Candidates for Information Centers

4 Introduction to Effective ICs

Difficulties with Current Information Centers

An Introduction to Computer Conflict

Computer Conflict—IC Professionals versus End Users

Computer Conflict in Various Sized Organizations

Real World Examples of Computer Conflict

ABC Corporation—Master Case Study of Information Centers

Purpose and Size of Each Information Center

Chapter Summary

Selected References

INTRODUCTION TO EFFECTIVE INFORMATION CENTERS

Management information system (MIS) managers, including corporate managers, have come to realize that everyday business computing activities are being rapidly changed by dramatic advances in information processing technology. These changes are so rapid in fact that the phrase "state of the art" tends to become almost meaningless. That which is at the leading edge today gives way very fast to something more sophisticated. In the typical organization, almost everyone is being impacted by these changes although those in management information systems are somewhat more affected than others. Everything seems to change so quickly. There are so many options available that MIS managers suffer too, to some degree, from the pace of change.

It is interesting, though, that in the face of these new challenges and opportunities there are some, perhaps even many, installations that steadfastly refuse to move to these new information processing approaches. This is particularly true in the area of acquiring and implementing microcomputers (i.e., personal computers) for end users in the organization's various functional units. Due to the importance of changing times on everyday computing activities, this text not only examines the appropriate means to manage information centers (ICs) to assist end users, but also concentrates on resolving or, at least, reducing computer conflict between the MIS professionals, that is the information center professionals, and the end users.

INFORMATION—A CORPORATE ASSET

Whether reference is made to IC professionals or typical end users of information processing technology, the tools employed by them to collect, organize, store, manipulate, and transmit information are regarded as having created an information asset. Obviously, information has always been used to transact business activities. However, by applying information processing technology, we have transformed the process into a "resource." How organizations use that resource, the information asset, largely

determines its impact on innovation, competitive position, and profitability.

As more systems for handling information develop through the assistance of information centers, that information itself accrues value. Its accumulation and its use have become so important that they nourish the ability to compete. An organization must have methods for creating, capturing, and using it. Such an ability is perceived—by management, by investors and bankers, and others—to give intrinsic value to an organization. In this sense, information has become an important corporate asset.

MIS managers are now managing this information much as they would any other corporate asset. The problem is that this corporate asset is harder to identify and harder to manage than are conventional assets. All assets have a life span, and information is certainly no exception. Once information is thought of as an asset, however, one has a basis of experience from other asset management techniques to deal with it. If information is viewed as a valuable corporate asset, then the technical staff members who have the operational responsibility for this function can be viewed as asset managers. The role is then analogous to other asset management functions. Successful management protects the integrity of the asset and at the same time promotes its productive use.

New Ways to Use the Corporate Asset

Collecting information has been revolutionized by the sophisticated coordination of computer and communications technologies. Networks at every level of interaction are being developed to facilitate the collection of powerful databases, affecting many different business functions. Utilizing these databases and networks is the substance of information asset management. Additionally, organizing this ever-expanding universe of data is now acknowledged to be a critical success factor in information asset management. A primary objective is not just to have a database, but to know what to measure from the database. Most organizations have stumbled over the problem of organizing and integrating this information asset. Technically unsophisticated business people went out, bought personal computers from their departmental budgets, plugged them in, and proceeded to build thousands of databases. The result has been a decentralization of information building which has been both unsettling and liberating. The average MIS department has a two-year backlog of requests for systems to produce needed information. People are unwilling to wait, and the combination of distributed processing, powerful micros, more user-friendly systems, and increased computer literacy in general has given end users the tools and knowledge to meet their own information processing needs via information centers.

The fact is—and this is verified again and again by the experience of larger companies—that “traditional” information management simply does

not meet today's demands. The tremendous influx of personal computers (PCs) has made the MIS department a little more humble. MIS management realized that there was a lot of good utilization of databases and that they needed to pull this back in, not to ignore it. Pulling the information asset back together is the first step in good management via effective information centers. Linking and coordinating the many information processing tools has become the mandate for information center professionals. Learning to make the most competitive use of the technology is the mandate of corporate management, including IC management within the information centers and end-user management in the organization's functional units.

AN OVERVIEW OF INFORMATION CENTERS

Information centers, whether at the home office or at remote locations, were initially defined as walk-in offices that offer advice to end users on which micros to buy. Currently, the IC is defined by IBM as a function that can exist within—or alongside—the traditional MIS department. It interfaces with end users, guiding them in the application of easy to use interactive tools, program packages, and techniques to enable them to solve their own problems. It should provide the following benefits: (a) greater responsiveness to end-user requests, (b) improved assistance to end users and to their management, (c) potential reduction in information processing maintenance, (d) improved productivity, (e) faster application development, and (f) greater awareness of the potential uses of data processing. To better understand information centers, their essentials are set forth below along with examples. Additionally, the relationship between information centers and management information systems is explored.

Nature and Direction of Current Information Centers

Several underlying factors affect information centers in any sized organization today. First, the information center concept is gaining and is expected to continue in popularity. Information centers are growing about as fast as anything that brings about a change in human behavior can grow. A recent survey has shown that most medium size and larger firms have two or more information centers. Second, the computer industry is going to have to live with them. Information centers are a real concept; they are not going to go away. Third, the information center concept could have a significant impact on one's career as a manager. How one deals with this issue may determine whether one emerges as a hero. Fourth, with the advent of microcomputers, end-user-oriented software packages, and fourth-generation computer languages, the demand for access to computing resources has taken a quantum leap. The pressure coming from end users has grown enormously as these user-friendly products come out and the knowledge level of the user increases.

Fifth, the impetus for many centers comes from the users themselves, particularly in instances where users think the MIS department is not giving them the service they feel they deserve or need. An information center at one Wall Street brokerage firm, for example, was organized after end users formed a kind of de facto vigilante committee and threatened to go outside and buy a number of micros if their internal MIS department did not meet their demands. In another situation, corporate management and end users at a large corporation completely circumvented data processing and unilaterally set up an information center. Today, that center is run as a separate entity, totally outside the MIS department. Sixth and last, the fundamental difference between the information center approaches is determined by the need to access the company's database. Basically, there are two classes of information centers: those in which getting into the corporate database on an on-line basis is a requirement and those in which it is not. In the latter case, the micros are included as part of the center, but otherwise micros are not feasible on other than a stand-alone basis because the tools are simply not there to connect them effectively to the mainframe.

Typical Examples of Current Information Centers

To illustrate information centers in typical organizations, the following examples are given. At a major New York-based stock brokerage firm, different users need different tools, and the information processing center provides a central place for the end users to come and get the tools they need. It is a computerized version of a library. The user comes not knowing how to get what he or she wants. The user asks the information center to solve his or her information problem, and the center dispenses the tools for microcomputers, intelligent or smart terminals, and external or internal database access codes. This is the information center's solution to the hodgepodge of hardware and software that has grown up in many organizations. From this viewpoint, the center is usually built around a special walk-in facility where the end users come for data and word processing help from a technical staff that is there to support them.

In other examples of the interaction between end users and the information center's personnel in the brokerage industry, Merrill Lynch offers debugging assistance to non-DP (data processing) personnel who have written software for their microcomputers; Drexel Burnham Lambert has developed standardized software packages for its information center clients; and E. F. Hutton has an internal newsletter with advice for microcomputer or terminal users, including critiques of new software and database services, and columns by other users on their latest projects.

As additional examples, information centers can differ significantly in the way in which they are structured. The one developed by the Essex Group, a major wire and cable manufacturer, couples personal computers and color display terminals with its mainframe, thereby relying on a

micro-mainframe mix. Others, such as Northrop's center, rely on the mainframe exclusively in such a manner that the IBM mainframe functions effectively as an internal time-sharing center. Notably, Northrop, which had received significant complaints from end users who claimed that its MIS department was unresponsive to their needs, set up the center to bring these users back into the MIS fold and plans to set up additional information centers throughout the company, linking them together via satellite. At this point, IBM PCs or other microcomputers do not figure at all in this multicenter network.

In other cases, organizations have based their information centers on outside time-sharing center services, for example, Bechtel Power, which decided to tie into the IBM Information Network rather than put the information center on its own IBM mainframe. The rationale given was that their own mainframe did not have the immediate capacity needed by the information center. In light of the above approaches to information centers, Chapter 4 explores various organization models that are currently widely used by organizations.

Relationship of Information Centers to Management Information Systems

An integral part of many current information centers is the provision for helping end users within a management information system environment. In fact, the impetus for setting up many information centers came from MIS users. For example, at the American Can Company, the term information center is a misnomer. In one building, there are twelve information centers, each one set up by the users themselves. End users are very proficient at developing decision support systems on their own. All they need from the information center, i.e., the information services department, is a programmed extract from a database from time to time to get them started.

The information services department provides a valuable service by evaluating new products and technology, getting users started, and providing occasional help. There may also be a secondary effect after information centers take hold. Because different groups develop common applications, the center will assume a larger scope than was originally intended. There will be a movement back toward building systems, with corporate models tying these applications together.

Currently, fourth-generation languages are widely used in decision support systems. At American Can, FOCUS, IFPS, and SAS/GRAPH—all fourth-generation languages—are used. In terms of fifth-generation languages used by information centers in most organizations, INTELLECT is being widely used as it is now marketed by IBM. Fundamentally, INTELLECT is an English-based query system that includes an interface to IBM's Structured Query Language/Data System and a graphics display option that links INTELLECT to IBM's Presentation Graphics Facility. In

essence, the hardware and software, needed in many MIS environments, is available in an information center, enabling IC professionals to train end users to employ user-friendly tools to meet their decision-making needs.

APPLICATIONS THAT SHOULD BE VIABLE CANDIDATES FOR INFORMATION CENTERS

Now that a brief overview of information centers has been presented, it would be helpful at this juncture to state what applications are viable candidates initially for information centers. Typical candidates do the following:

- Make use of prepackaged software, such as spreadsheets, graphics, project scheduling, and statistical analysis.
- Require a minimum amount of input data.
- Require a minimum amount of printed output.
- Make use of inquiry and simple reporting requirements.
- Focus on "what if?" type applications.
- Require fast startup time.
- Have need of "external" data.

These applications, in turn, can be contrasted with ones that are not deemed good initial candidates for information centers.

Typical not so viable candidates for information centers are as follows:

- Applications using a large amount of data or requiring a large amount of printing.
- Applications requiring a large amount of manually inputted data.
- Enhancements to existing mainframe applications.
- Replacement of current mainframe applications.
- Complex applications requiring coordination of data from many sources.
- Transmission of data to other places in the organization.

This second listing refers to applications that should be handled by the MIS department. In contrast, the first listing refers to good candidates for the typical information center during its early stages of development. However, as end users become proficient in utilizing information system technology, some of the above applications might be appropriate. The appropriate circumstances will dictate which way the information center should go based upon the needs and wants of end users.

DIFFICULTIES WITH CURRENT INFORMATION CENTERS

Having stated typical good and not so good candidates for information centers, it would be useful to discuss the other side of the "information center" coin regarding their difficulties. The growing popularity of information centers does not mean success. Information centers are in danger of falling victim to poor implementation, inadequate support, and misconceptions about their purpose. Typically, information centers return good results in their early years and mixed results in succeeding years. Chief among these difficulties is the failure to set up an effective consulting program. Instead of teaching end users how to develop application tools, information center professionals often continue to write the programs themselves. Another difficulty is the larger than normal demands information centers place on hardware resources. Because end users tend to concentrate their processing needs over peak hours, mainframe processing should be boosted by a significant factor immediately and then increased as end-user demand grows. If not, response time suffers, and end users lose interest. Also, microcomputers should be part of the information center's "portfolio" of solutions.

Another difficulty with information centers is territorial friction between the MIS department and the IC staff. The relationship between the two should stress cooperation and eliminate competition. If the information center takes a combative stance, it can make MIS look worse than it ever has. For example, the end user sees two windows. The individual goes to the MIS department and is told that the application wanted is available in two years for \$70,000. Then the individual goes to the information center and finds out that it can be obtained in seven weeks for less than \$7,000. Hence, the information center can promote the perception of the MIS department as separate and grossly overrated, or it can present a united front and portray itself as an extension of the MIS department, thereby taking the pressure off MIS. When the end user comes looking for an application, an IC professional should say, "Yes, *we* can do that very quickly and inexpensively now." The emphasis should be on the *we* rather than on the information center versus the MIS department.

Even though there are other difficulties, overriding many of them is the fact that many in the MIS department would like to preserve the status quo. Why add more friction in any organization when current research results indicate that information centers tend to produce poor results over time? Due to the importance of information centers and their related difficulties, the next matter for discussion is computer conflict between computer professionals and end users.

AN INTRODUCTION TO COMPUTER CONFLICT

Many computer professionals, although they are reluctant to admit it, have developed elitist attitudes about computer equipment and the ability

of end users to do anything meaningful with it. The thought of unsophisticated users selecting, installing, and applying this equipment is enough to cause sleepless nights for seasoned computer professionals. More importantly, it is a major cause of computer conflict throughout the typical organization.

Much has been written about the loss of control that IC professionals suffer when end users purchase and operate their own microcomputers. This loss of control includes the risk that micro users will begin pressuring MIS for more and better applications using centralized and local databases, designed with the same type of human interfaces that are currently available in some of the micro software packages. In addition, end users will demand that new applications be developed more quickly and at a lower cost than computer professionals have been able to deliver in the past. Needless to say, these areas have great potential for computer conflict.

Generally, micro users do not understand the complexity of developing and operating a real-time, multiuser system. This gulf between the two groups lays the groundwork for potential computer conflict. Also, this lack of understanding has made it extremely difficult for both groups to share ideas and language relating to business needs and the contribution computer automation can make to the organization.

As an introduction to typical computer conflict, consider the following scenario. The director of a media buying department within a large advertising agency noted with self-congratulatory rhetoric how he had selected a \$2,000 microcomputer system without the assistance of his organization's MIS department. He was effusive about how smart he had been in picking out his "own computer." Along with one of his media research assistants, he had looked into the matter and had picked the "very best machine" for the job.

The computer professional almost fell off her chair when he replied to her innocent inquiry about what the job was. "Why, to dial into a data bank to find out the latest information about media," he responded. Her comment that he could have accomplished the same job by using a dumb terminal (i.e., one that can send and receive information only) for a thousand dollars less fell on deaf ears. It was immediately obvious that her remarks were directed to a most blissfully ignorant individual as far as computers are concerned. The brouhaha surrounding microcomputers currently is symptomatic of an epidemic sweeping through U.S. corporations. The net result is an unusually high degree of conflict between computer professionals (whether they be MIS or IC professionals) and end users.

Computer Conflict—IC Professionals versus End Users

When considering the IC professional versus end user conflict, it is important to keep in mind the role to be played by computer mainframes

today and in the future. As indicated previously, in hearing the enthusiasts talk, one would think that soon there will be nothing but microcomputers. This, of course, is not likely to be true. The mainframes will still play an important role in most organizations. These functions include batch production, the management of central databases for decision support, the management of hierarchical networks, number crunching, and so on. Hence, computer mainframes will be widely used to accomplish a wide variety of organization tasks. This is in contrast to microcomputers, which tend to be the major province of end users. Because the MIS department and its information centers are an integral part of overseeing microcomputer activities, it is a most important factor causing computer conflict in various sized organizations—the subject matter for discussion below.

Small Organizations. Because microcomputer systems have become remarkably affordable, there are many reasons for a small organization of any kind to benefit from the installation of such a system. The advent of multiuser systems, increased storage capacities, improvements in user friendliness, and better software have made micros the computers of choice for more and more small businesses every day.

Many businesses that wanted to computerize a few years ago, but needed more in the way of applications software than was available for micros, have turned to minicomputers. Some found them difficult for their employees to use, as well as expensive, especially with their largely customized software. Many of these organizations have since traded their old minis in for multiuser microcomputer systems, and many new users have gone directly to micros because they are so inexpensive and multifunctional. Applications that would have cost hundreds of thousands of dollars on a computer mainframe just a few years ago can now be packaged on a micro for somewhere between \$20,000 and \$50,000. At this cost, a system will often pay for itself within a year, if it is properly utilized. For example, one businessman using microcomputer software compared the costs with that of a popular minicomputer he had previously used. The mini, with software, had cost \$175,000; training costs amounted to \$35,000. His microcomputer and software together cost \$30,000 with "virtually no training costs."

Although the hardware in micros is relatively inexpensive, it is only one factor in the overall operational aspects of such a system. Software design, training, and other factors also play important roles. But the simple addition of all those extra terminals makes it possible for a system to reach out and automate every department of a small company.

Due to the far reaching capabilities of microcomputer systems in these small organizations, there is the usual problem of who is in charge of these systems. Conflict problems also arise due to the nature of the service and the maintenance of these systems. In the next section of this chapter, typical factors underlying computer conflict as perceived by IC professionals and end users are examined in real world examples.

Medium Size Organizations. Conflict within medium size organizations can arise from the fact that computerized systems are found throughout a typical organization, as is true in a small organization. Generally, however, computer conflict seems to take on another dimension due to the existence of more managers in a medium size company than in a small one. Managers fear the introduction of the micro into their offices—and not necessarily without good reason. As an example, a middle level manager generally is the only one in the department who knows how the whole operation works. The computer then comes along and is programmed with the same or almost the same knowledge. As a result, the middle level manager often feels threatened—that he is in competition with the computer.

As a rule, managers at this level are a bit hesitant about working with computers, although they tend to believe it will make their subordinates more productive. For example, a group of executives from a major firm asked for help in making a career change. They explained that their division was being computerized and that they were unwilling to work with computers. In essence, their anxiety level was so high that they were willing to give up their jobs. Unfortunately, this is a very common phenomenon.

Many organization managers believe that if the *rules* by which a manager at any level makes his or her decisions are computerized, it makes his or her replacement time that much shorter. Similarly, it is conceivable that the microcomputer can make the manager feel that he or she is much more expendable. Needless to say, under the foregoing conditions, conflict between MIS and IC professionals and managers (i.e., end users) can be at a very high level.

Large Organizations. Large organizations have larger amounts to spend on computer hardware and software, in particular, on micros. As a result, there are more computer mainframes and micros to assist management and operating personnel. It is generally taken for granted these days that the larger the organization, the more automated its methods and procedures are. Also, these larger organizations have a tendency to hire many employees with master's degrees in business administration (MBAs) who know how to use the capabilities of microcomputers.

As one example of a large corporation, consider a manager who works with a management resource planning system. Formerly, the manager decided when it was time to place another order; now the computer alerts him instead. However, the manager still has to check and approve the order. The computer has relieved this manager of a portion of the paperwork, but not the decision-making role. In addition, the manager still provides his superiors with the same reports as always, but the computer allows him to write the reports in more detail and with more efficiency. Finally, because the computer has helped formalize decision-making rules, the manager is able to formulate more specific policy and can estimate better how his boss will react to his decisions.

The short-term trend toward technically oriented managers who are knowledgeable about computers can be a cause of conflict in large organizations. However, in the long run, there is a need for a balance of technical and human skills in managers of large organizations (as in any size organization). If this balanced approach is taken, conflict will be kept to a manageable level; however, if the technical aspects override the human element, computer conflict will approach a high level.

Real World Examples of Computer Conflict

As an example of how computer conflict can occur unintentionally, the experience of a big eight certified public accountant (CPA) firm is considered. At one of the CPA offices, accountants and consultants use a mix of Osborne portables, Apple IIs, and Radio Shack TRS-80 (IIs) in a variety of day-to-day work. Consultants at the firm like to take the portable Osbornes to their clients' offices for auditing and other tasks. The Osbornes and Apples are used to help with the auditing and development of statistics for government compliance at hospitals, for instance. The most popular software is SuperCalc spreadsheets and a database manager, in addition to such things as a due-date tickler file in the tax department.

The TRS-80s perform such chores as audit scheduling and internal accounting. And, also, they operate in a distribution data processing mode, which involves downloading master files from the computer mainframe for data entry then returning to the mainframe so that reports for the local office are produced. Another TRS-80 is tied to a time-sharing computer in another city which performs a massive file manipulation then returns the data for client reports. The person whose job includes keeping track of the myriad of micros is concerned about the buildup of many different systems that are very similar but have no common databases.

What was originally intended to meet the needs of specific end users today may be the cause for conflict tomorrow. Because the potential is here for conflict, an effective corporate strategy needs to be employed today so that this potential for conflict is minimized before it happens. In other words, there is need for a positive approach rather than a negative approach, resolving computer conflict before it occurs.

As another example, microcomputers in a large state government can be the source of computer conflict. MIS management endorsed an objective to provide all administrative offices with microcomputers. In one department, because the personnel had become very familiar with the Radio Shack TRS-80, they convinced the department head to obtain this equipment; another department opted to acquire IBM PCs; other departments chose Apples, DEC's, and so on. As each of these departments developed internal mechanisms for processing and sharing programs internally, each department head was able to observe a definite improvement in their operations. However, when the departments were called upon to exchange

information and provide other offices with data, it was necessary to rewrite many computer programs. In this case, the plan identified preferred equipment but did not impose the control necessary for anticipating technological problems that arose during its implementation. Adequate time should have been allowed for educating personnel. Installing the system in phases, pilot testing, and providing adequate time for the evaluation helps to identify alternatives and costs.

From this example, it can be seen that the plan was not a well-coordinated one since it allowed too much autonomy and forgot about the need to have the departments interface with one another. An effective plan must establish milestones to measure progress toward achieving objectives. Similarly, the plan should provide flexibility for responding to factors that can impact its success. This is especially true of the technological factors associated with microcomputers, since they can be cost effective in business applications if planned effectively on this basis. Thus, the lack of compatible hardware—a common problem—and the attendant needless computer conflict between MIS professionals and end users are highlighted in this example.

From another perspective, computer conflict can be caused by too much involvement in end-user software development projects by IC professionals. Although they can legitimately aid programming efforts in an advisory capacity, information centers should resist the temptation to participate in basic development tasks such as defining specifications, designing software, and writing code. The ultimate responsibility for making a new application operational should rest squarely with the nontechnical end user. Information centers that exceed their recommended roles and become entangled in the nitty-gritty aspects of program development can find the way paved with hazards.

For example, a large U.S. military installation completed the development of its first information center, which was equipped with three workstations and staffed with two full-time employees. One of the center's main missions was to take up some of the application development slack left by the base's overburdened central MIS department. Recognizing the need to make its presence known to potential clients, the information center launched its operations with an open house, encouraging the base's end users to drop by for a get acquainted visit. Unfortunately, the advertising ploy backfired. By the end of its first day of operation, the center had already fielded from twenty to thirty end-user requests for application development—many more requests than its staff was prepared to accommodate. To make matters worse, one of the requests for new systems came from the base commander himself. That request consumed so much of the information center's resources that the other jobs had to be put on extended hold. The sad part of the story was that many of the lower priority requests were comparatively simple and could have been fulfilled in an hour or two had they not been placed on a waiting list.

In summary, such stories of creating undue computer conflict underscore the dangers of overextending an information center's charter and should persuade MIS management, working in conjunction with IC managers, to restrict the role of their own end-user support organization. Initially, the information center should advise the organization's end users on a wide assortment of application development matters, but should stop short of doing any programming work. The center should not create any deliverables to end users, but rather strive for user self-sufficiency. The goal is to help end users help themselves. From this perspective, the information center should learn "to crawl before it walks."

ABC CORPORATION—MASTER CASE STUDY OF INFORMATION CENTERS

To understand the do's and don'ts of information centers, a typical master case study—the ABC Corporation—is presented in chapters 1 through 7. This corporation is a manufacturer and distributor of consumer products for the home market. Its current sales are \$300 million annually, and it has four manufacturing plants (in Chicago, Dallas, Los Angeles, and Newark) with attached warehouses. Most of its 4,000 employees are located at these four sites; however, about 250 employees are located at corporate headquarters in Cincinnati.

Purpose and Size of Each Information Center

An information center is found at corporate headquarters and at each plant with an attached warehouse. Since the goal of each information center is to support end-user computing, each center is customer oriented and each attempts to accommodate its services to its customers' business environment. Except for training, all services are offered on call during normal working hours.

Each information center provides consultation, training, and technical assistance to all levels of headquarters staff plus plant and warehouse personnel. Consulting includes discussions to determine whether an application is suitable for end-user computing, and, if so, how best to do it. Sufficient training is provided to make the user comfortable with a software package or procedure without transforming the person into a technical expert. The term "technical assistance" encompasses a broad range of on-call services aimed at keeping the client functioning and productive in his or her computer work. Information center services also include justification, tool selection, security, and control; equipment ordering (paid for by the user); equipment setup; and limited equipment troubleshooting and maintenance.

Each of the three members of the information centers at each location, including the leader or coordinator, supports one or more tools and provides

backup in others. A fourth person—a secretary—may also get involved by teaching word processing and answering technical questions about several of the tools. Because of its size, the center's personnel do not write applications for their clients. Although the center's services are available on call, there is a four-hour limit on consultation or technical assistance per application in terms of application development or programming thereby ensuring that no single user monopolizes the center.

When an end user comes to the information center for advice on a new application, an IC professional discusses the problem with him or her and determines the best approach for handling the need. For straightforward applications, the individual simply recommends an approach or a software package. For a more complex problem, a second IC professional is usually called in to help. If the application is complex enough to require contracting for conventional development by the MIS department, the end user is directed to the appropriate MIS professionals.

Training is geared to end-user schedules. Courses are also designed to give a working knowledge of tools without turning users into technical experts. Each course maximizes hands-on student exercises and minimizes lecture sessions, and no course takes longer than one day. Each class is limited to five people, and for users with seniority, classes are available on a one-on-one basis. Although there are no published class schedules, a class is taught when two or more users have requested it. Waiting time to take a class is typically less than two weeks.

Although the information centers look ideal on paper, this is far from the truth. In the continuing parts of this master case study, typical problems—including those related to computer conflict—are explored. Further discussion will be left until that time.

CHAPTER SUMMARY

In this first chapter, the focus was initially on the use of information as a corporate asset. That is, managers must know their company thoroughly and know as much as they can about their markets and competitors. This can be accomplished by utilizing information such that it gives the company a competitive edge. On the other hand, the consequences of inadequate information which can be viewed as a corporate liability can be devastating. Next, the focus was placed on the origins of information centers, and typical examples were given. This information center background was augmented by its relationship to current management information systems. This material served as an introduction to applications that should be viable candidates for information centers. In turn, difficulties with current information centers and computer conflict between IC professionals and end users were discussed. The chapter concluded by initiating the text's master case study of information centers for the ABC Corporation.

SELECTED REFERENCES

- Atre, S., *Information Center: Strategies and Case Studies* (Boston: Weingarten Publications, 1986)
- Beaver, J. E., "Promoting Personal Computing," *Computer Decisions*, March 15, 1984
- Brown, G. D., and D. H. Sefton, "The Micro vs. the Applications Logjam," *Datamation*, January, 1984
- Carr, R., "The Dawn of the Universal Workstation," *Computer Decisions*, March 15, 1984
- Contino, R., "Unmasking Some Myths about Computer Literacy," *Modern Office Technology*, June 1984
- Dooley, B., "Information Centers on Rise, Need DP Mgmt. Boost," *Management Information Systems Week*, June 6, 1984
- Dowdell, W. D., "What MIS Professionals Need from Their 4GLs," *Computerworld*, September 29, 1986
- Dunn, K. L., and D. R. Schuster, "Running the Information Systems Organization Like a Business," *Journal of Information Systems Management*, Spring 1986
- Egan, M., "Firestone: Implementing a Micro Strategy," *Micro Manager*, April 1984
- Freedman, D. H., "Are We Expecting Too Much from Strategic IS?," *Infosystems*, January 1987
- Goldman, R., "Micros Help Shift Productivity Emphasis," *Computerworld*, May 28, 1984
- Gordon, R. M., "Information As a Corporate Asset," *Management Technology*, June 1983
- Grove, A. S., "Why Management Is the Boss's Job," *Fortune*, January 23, 1984
- Guimaraes, T., "The Evaluation of the Information Center," *Datamation*, July 15, 1984
- Halladay, M. E., "More Alike Than Different," *Information Center*, August 1985
- Hall-Sheehy, J., "Seven Computing Realities," *Information Center*, October 1986
- , "Revolutions and Evaluations," *Information Center*, July 1987
- Hannan, J. H., ed., *Managing the Information Center Resource: Success in End-User Computing* (Pennsauken, N.J.: Auerbach Publishers, 1986)
- Head, R., "Information Centers, Information Systems, Divided They Stand," *Computerworld*, April 15, 1985
- Johnson, B. M., Jr., "Data Processing—Out of Control," *Operations Management Review*, Winter 1984
- Johnson, R. T., "The Infocenter Experience," *Datamation*, January 1984
- Karten, N., "Reshaping the Info Center," *Computerworld*, October 8, 1986
- , "What Exactly is Productivity, Anyway?," *Information Center*, July 1986
- , "Where There's Smoke, There's an Information Center," *Information Center*, January 1986
- Keefe, P., "Dewar's Career Survey Disputes Popularly Held Opinions of DP Professionals," *Computerworld*, January 30, 1984
- Knight, B., "Info Center Concept Enters Middle Age," *Software News*, October 1985
- Kotler, J. P., "What Effective General Managers Really Do," *Harvard Business Review*, November-December 1982
- Kull, D., "Information Centers: Power to the People," *Computer Decisions*, June 1984

- LaMotta, T., "Accurate Information As a Mission," *Information Center*, May 1985
- Lekacos, A., "Micros Seen Benefiting Smaller Businesses Most," *Computerworld*, September 26, 1983
- Lipton, R., "The New Age of End-User Programming," *Business Computer Systems*, January 1985
- Makita, R., "Reshaping the Info Center," *Computerworld*, October 8, 1986
- _____, "Satisfying MIS and Users," *Computerworld*, October 8, 1986
- Michtom, J., "Does Your IC Measure Up?," *Information Center*, August 1985
- Perry, W. E., *The Information Center* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1987)
- Rahaim, J., "Who's in Control Here?," *Computerworld*, January 16, 1984
- Rockart, J. F., and L. S. Flannery, "The Management of End User Computing," *Communications of the ACM*, October 1983
- Rockart, J. F., and M. E. Treacy, "The CEO Goes On-Line," *Harvard Business Review*, February 1982
- Stibbens, S., "Microcomputers: Friend or Foe of the MIS Manager?," *Infosystems*, October 1982
- "Survey of Info Centers Reveals Good News and Bad News," *Information Week*, August 12, 1985
- Sweet, F., "Managing Data-Driven Development," *Datamation*, June 15, 1985
- Talsky, G. R., "Micros Trigger Rapid Growth," *Mini-Micro Systems*, June 1984
- Thierauf, R. J., *Effective Management Information Systems*, 2d ed. (Columbus, Ohio: Charles E. Merrill Publishing Company, 1987)
- Vaca, J. R., "Life, Liberty, and Pursuit of Decision Support," *Information Center*, September 1986
- Verity, J. W., "Minis Lose out to PCs," *Datamation*, November 1983
- White, L., "New Life for the Info Center," *Computerworld*, May 14, 1986

Part II

Planning for Effective Information Centers

2

PLANNING AN OVERALL STRATEGY FOR INFORMATION CENTERS

ISSUES RAISED AND EXPLORED

- To examine the needs of end users as a starting point for developing an overall strategy of information centers.
- To set forth an overall strategy for effective planning of a typical information center.
- To develop an overall strategy for resolving or, at least, reducing computer conflict between IC professionals and end users.
- To set forth Part I of the IC Questionnaire for evaluating a typical information center.
- To apply this first part of the questionnaire to the ABC Corporation as a way of determining its IC planning problems.

OUTLINE

Introduction to Planning an Overall Strategy for Information Centers

A Starting Point—Defining the Computing Needs of End Users

Planning an Overall Strategy for Information Centers

Integration of MIS Department with Information Centers

Development of Objectives for Information Centers

Utilization of a Phased Approach over Time

Flexibility to Meet Changing Times

Planning an Overall Strategy for Resolving or, at Least, Reducing Computer Conflict Problems As Perceived by IC Professionals	
Problems As Perceived by End Users	
Planning of Information Centers for the Coming Year	
Development of Information Center Budgets	
Development of Information Center Questionnaire	
Purpose of IC Questionnaire	
Major Sections of IC Questionnaire—Part I through Part VI	
Recommendations from Using IC Questionnaire	
Part I of IC Questionnaire—Planning an Overall Strategy for Information Centers	
Major Sections of IC Questionnaire—Part I	
ABC Corporation—Planning an Overall Strategy for Successful Operations	
Planning Problems of Current Information Centers	
Evaluation of Planning Problems of Current Information Centers	
Recommendations to Improve Information Center Planning	
Chapter Summary	
Notes	
Selected References	

INTRODUCTION TO PLANNING AN OVERALL STRATEGY FOR INFORMATION CENTERS

In order to plan an effective overall strategy for information centers, there is an initial need to examine the current trend in computing. As discussed in Chapter 1, the trend is toward decentralized processing, i.e., distributed data processing versus centralized processing. A current report from The Diebold Research Programs, New York, forecasts that the trend toward decentralizing information systems in business organizations will continue for another five to ten years. This decentralization is having a great impact on the role of information centers and their relationship to end users. Essentially, the decentralization brings computer processing power to end users at all levels in an organization. It is from this perspective that an overall strategy for information centers is developed in this chapter.

Having defined the computing needs of end users initially, the planning of an overall strategy for information centers is then discussed in some depth. This is followed by planning an overall strategy for resolving or, at least, reducing computer conflict in the typical organization. Next, the detailed planning aspects of information centers are explored along with the nature and purpose of the information center questionnaire. Part I of the IC questionnaire is developed and applied to the ABC Corporation—the text's master case study.

A STARTING POINT—DEFINING THE COMPUTING NEEDS OF END USERS

Before planning an overall strategy for information centers, it should be recognized that end users are the principal reason for the existence of information centers. As a starting point, it would be helpful to look at the types of end users and define their computing needs. Fundamentally, there are four different types of end users. First, the *passive end users* almost never ask for assistance from the information center, regardless of the opportunities for improved management effectiveness or operational efficiency. Second, the *overly active end users* want the information center to produce system solutions even when such applications are not cost justified. Third, the *half-informed end users* consider themselves "systems-wise" and tend to insist on their rights to make decisions about computer hardware and software. Fourth, the *rational end users* take a balanced perspective to their system problems by seeking the assistance of the information center for problems that have an important impact on the organization within their functional area.

All four types are found in a typical organization; meeting their computing needs is the focus of the information center. By definition, the information center is a training center which attracts users with varied skills and computer knowledge. The information center makes available training materials to every kind of end user. Underlying the information center concept is the assumption that end users, in particular line managers and corporate staff, can meet on neutral ground with IC professionals to satisfy their computing needs. For many end users, this approach to an information center has become a viable means for them to cope with solving their pressing problems on the job. As such, an overall strategy for planning of information centers is given below.

Although many end users feel they have received excellent training and support from the information center, many others are still waiting for attention and are as disgruntled with the information center responsiveness as they ever were with MIS. Managing the demand for services has become one of the center's biggest challenges, fed by ever-growing user expectations and a sometimes overly well-intentioned information center service orientation.

In regard to the disgruntled end users, they are in about the same position as the MIS programming staff. While many programmers are happy to be relieved of "nuisance requests" from end users, they are less than ecstatic that users, with information center support, are becoming computer mavens. Though the intensity of feelings appears to be diminishing a little, the information center still represents the enemy to the MIS department because, although it may be a part of the MIS organizational chart, the information center aids and abets end-user computing. More importantly, there is the typical conflict between the MIS department and end

users, which is caused by differences in background, interest, outlook, and so on. In view of this still pressing problem, planning an overall strategy for resolving or, at least, reducing computer conflict between the MIS professionals and end users is set forth in the chapter. Essentially, conflict is viewed from the IC professional's viewpoint versus end users since the typical information center is staffed by personnel from the MIS department.

PLANNING AN OVERALL STRATEGY FOR INFORMATION CENTERS

Before an overall strategy can be planned for information centers, it is helpful to look at the conditions that underlie them. When information centers first appeared, they were seen as the solution to everything ailing the MIS department. If the MIS department could get end users to generate reports and one-time-only documents (which MIS did not really want to deal with anyway), the application backlog would shrink to much smaller proportions. Hence, the MIS department would be relieved of the badgering from end users who want just one more change, and the adversarial relationship between end users and MIS would reverse itself over time. Everyone, so the thinking went, would live happily ever after. Needless to say, these were preposterous presumptions.

Increasing MIS Backlog. In reality, the tools of the information center trade, namely, microcomputers and user-oriented languages, have created a hunger for number crunching and graphics that could not have been imagined several years ago. Just as none of the grand industry schemes of the last twenty years has cut back significantly on backlogs, information-center-supported, end-user computing has stood little chance of doing any better. Yet, there was, initially, an intense need to believe that information centers could fulfill this goal.

During the first few years of data manipulation, researchers surveyed information center managers to see if they were successful in reducing the backlog. A majority of these managers said yes, pointing to user-developed applications that would previously have added to the MIS backlog. Not many people questioned these results. This response is not surprising; a backlog typically represents MIS management's guess of the amount of work yet to be done. So, many information center managers drew a logical conclusion. However, only recently has there been widespread recognition that whatever else information centers are accomplishing, they are *not* reducing the backlog. If anything, that backlog is increasing. End users are learning enough about computers to request even more complex systems from MIS than ever before. Thus, the increasing MIS backlog is a necessary ingredient in developing an overall strategy for information centers.

In research conducted by Info-Dyne, 81.1 percent of the nearly 550 respondents it surveyed said that their organizations have an applications development backlog. Twenty-eight percent of the respondents reported a backlog of from zero to six months; 14 percent said theirs is more than twenty-four months. There is solid representation at each six-month increment in between. More importantly, 69 percent of those surveyed said that their backlogs are increasing.¹

Relationship of Overall Strategy to Productivity. Building upon the fact that MIS backlogs are increasing, there is a need to develop an overall strategy for information centers that is based upon improving *productivity* of end users. Essentially, productivity has to do with the relationship between input and output, i.e., between the effort that goes into a job and the result that comes out of it. In effect, there should be "more bang for the buck." By helping end users via information centers to solve pressing organizational problems, the net effect should be productivity gains.

To improve the organization's productivity, there is a need to capture the current diverse sets of technologies and marshal them into a well-coordinated plan that will generate positive results for the entire organization. This importance has been highlighted over the past few years. For all of the computing power that was available in the 1950s, 1960s, and 1970s, it is only in the 1980s that the coordination of diverse computing activities has become a *critical success factor* in an organization's success. It would be helpful to look at the reasons why this is happening.

First, the information explosion has resulted in more data than people can possibly use: syndicated data, data internally generated on the PC, mainframe-generated data, and so forth. One of the great frustrations has been how to turn such data into effective information. *Second*, software technology is increasing at a very rapid rate. Who knows what comes next, with satellites, video discs, and all kinds of programmable capability? Having a well-organized, coordinated set of objectives and priorities ensures that the emerging technology fits smoothly into a plan for an organization. The transition can be an ongoing evolutionary process—not a revolutionary one, one with a built-in obsolescence that creates great turmoil. *Third*, information centers are caught in a very complex, ever-changing environment—not just the software, hardware, communications, and networking, but the total environment of people, education, business, government regulation, and international activities. Whatever planning process is put into place, it has to account for all of these realities. The solution is to have an effective information center strategy—one that encompasses all of the different kinds of processing and requirements of the information center and can categorize operations, production, and strategic kinds of applications that logically fit together.

In planning an overall strategy for information centers, a tremendous amount of consideration has to take place in relating centralized to decentralized kinds of operations. One of the first things that many organizations

do is to standardize on a certain type of hardware or software. Typically, a forced standardization occurs without much planning, thought, or consideration to the different kinds of activities going on in the organization; the aim is rather to halt the proliferation of diverse sets of incompatible technologies. Without a coordinated plan, the various applications spread across an organization will be very effective in their isolated, narrow set of objectives, but they are not going to communicate and work well together.

With the above factors in mind concerning planning an overall strategy for information centers, it is helpful to set forth specific factors that are an integral part of this strategy: (1) integration of MIS department with the information centers, (2) development of objectives for information centers, (3) utilization of a phased approach over time, and (4) flexibility to meet changing times. As will be seen later in the chapter, these important factors underlie the development of the information center budgets for the coming year. Due to their significance, they are discussed at some length below.

Integration of MIS Department with Information Centers

As a starting point for an overall strategy for planning information centers, there is a need to integrate successfully the MIS department with the information centers. The initial focus should be on the proper staffing of the information centers; to ensure that "the right hand knows what the left hand is doing," the MIS manager should select capable MIS professionals to manage and staff the information centers. For successful IC operations, these professionals should be top performers with excellent interpersonal and communications skills. Because of the fast paced nature of their jobs, they should also be self-starters and good organizers who can juggle many tasks at once. To act as consultants, they should have experience both in the computing tools that they support and in general business practices. Moreover, these IC professionals should complement each other in skills and knowledge of business techniques. Although many information centers are not staffed on this basis, nevertheless, this is an end goal for a typical organization.

Integration also takes the form of hardware and software linkage to assist end users in solving a myriad of problems. More specifically, this refers to the linkage of computer mainframes to microcomputers using data communications so that end users can access the data in the organization's database. For example, this approach within a DEC/IBM computing environment provides flexibility and comprehensiveness while retaining compatibility from the MicroVAX right up to a cluster of VAX mainframes. This enables end users to start small and grow at their own pace without any risk of having to start over. The software includes connections that permit IBM and DEC computers to share data. It is also possible to pass data between different software products so that end users can work with

the same data on different spreadsheet systems. In terms of functionality, a range of information management tools, fourth-generation languages, spreadsheets, word processing, and electronic mail software is offered. In addition, many popular information center products, like INTELLECT, run on VAX equipment, and support is available through DEC.

Under this umbrella, the MIS department can prepare a "snapshot" of production data from the IBM mainframe for the information center. The information center staff, using connectivity products, can then take that snapshot and offer it to the end users in any required format. Needless to say, data communications capabilities play a very big part in this integrated approach. DECnet provides distributed networking among DEC products and links to other vendor mainframes through SNA Gateway and other interconnection products. Overall, this integrated approach provides a simple and an expandable environment for current and future end-user needs.

Development of Objectives for Information Centers

In order to develop an overall strategy for the information centers, a number of objectives can be developed, including being of great assistance to end users, providing effective training in the use of micro hardware and software, ensuring adequate security over end-user micros, expanding the information centers when deemed necessary, developing the IC professionals who staff the centers, and ensuring that the latest MIS technology is available to end users. Several other objectives are discussed in more detail below.

A most important objective that needs to be considered on an ongoing basis is matching the information center strategy to the organization strategy, that is, making sure that the information centers are deeply involved in the formulation of the organization's strategic and tactical plans. Hence, it is necessary to identify the "driving force" of the organization and choose projects based upon how closely they support this driving force. Related to this objective is organizing priorities and work flow to focus on the most important, highest return opportunities first. The information centers should be careful not to expend large amounts of time and resources on those things that do not matter much. In other words, those end-user projects that are critical to the success of the organization should be an important focus of information center activities.

Another important objective is to assist end users in applying tools to solve business problems in the organization's functional units. Many information centers simply train users and then leave it to them to figure out how to apply the appropriate tools to their business problems. A more successful approach is to help end users identify which areas to attack, i.e., the critical ones, and then guide them to apply the proper tools to solve

them effectively. Closely related to this objective is one of improved communication between the information center staff and its users. Information center management should meet regularly with user management to review progress and identify future applications for tools and services. They should encourage their staff to establish and maintain a high level of interaction with users and look for opportunities to apply information center tools to their business problems.

In reference to the last point about opportunities, there is a need for an objective that centers on the information centers being proactive, not reactive. The information centers should not wait and see what requests and projects come in; but rather, the IC professionals should seek out those opportunities that offer the greatest potential returns and should then stay involved in the end users' business. The information centers should be creative and seek out opportunities to apply tools and technology in new and different ways.

Utilization of a Phased Approach over Time

Another important factor in the planning of an overall strategy is the need to identify the development of information centers in phases, i.e., a phased approach. Most successful information center installations have gone through three distinct stages of development: (1) start up (twelve to eighteen months), (2) growth and expansion (one to four years), and (3) maturity (after four or five years). The more successful centers have generally started small first working with a pilot end-user department or application with good potential. Once these initial encounters have proven to be successful, their movement is on to bigger and better things.

It is interesting that when the information center effort begins, typical goals revolve around the issues of the reduction of clerical effort in order to speed up reporting processes and, perhaps, to help hold down increases in the clerical staff. In addition, from the MIS perspective, another goal of the information center may be to help stem the growth of the use of micros. While some organizations have had more difficulty than they should in reaching this goal (many have not yet reached this goal and some probably never will due to computer conflict between IC professionals and end users), the development of this environment should be viewed not as the end, but only as the completion of the primary phase in the building of the information center environment.

The attainment of this primary level of information center service may create a feeling of complacency within both MIS and end-user departments. At this point, the MIS manager's attention should be focused on further development of the information centers and progress toward areas in which real growth can be realized. Hence, once the information centers have been accepted, when end users begin to use them, and identifiable

results are forthcoming, there is need to push for their use in areas in which dramatic results can be realized.

Given that the organization has a reasonable record of success with its information centers, that end users are using a computerized mode to do much of the work they formerly did by hand, and that, as a consequence of those circumstances, they are willing to consider doing more, MIS management should continue its efforts to expand and refine the information centers. The same principle applies here as it does to the overall issue of the MIS function: If solid information centers are in place, they must be developed further to explore new horizons.

A point of movement to the next phase of the information centers should center on the help and encouragement of the MIS department. Once end users are comfortable with their information centers, they begin to move from the processing of basic information to areas in which they are using that information as a base; then, the power of the information centers can be used to address such areas as forecasting and modeling. The ability to use the organization's data, to build information center databases that can then be manipulated to help middle and senior level management to obtain a clear understanding of the effect of different situations, moves the information centers' contribution into areas in which their real value can begin to be understood. Such a situation can only be of benefit to all concerned.

As an example, the organization's inventory information is available through the information center. Using that data as the base, the user can build a model that will address questions such as, "What is the effect on cash flow of a 15-percent reduction in inventory?" "How would such a reduction affect the safety stock requirements?" and "Is the increased cash flow worth the potential exposure to the manufacturing process that would occur as a result of the safety stock reductions?" Although these are rather basic questions, any organization should be able to answer them without an information center, right? Well, perhaps, but it is not now being done in many organizations, with or without an information center.

Flexibility to Meet Changing Times

Flexibility as part of an overall strategy for information centers to meet changing times can take several directions. However, flexibility is typically related to end-user hardware and software. Organizations that have installed various types of computers to try the information center idea sometimes find that their systems cannot be upgraded, that is, they are forced to rewrite completely everything they have done so far. In these cases, a simple and inexpensive solution can turn into a complex and expensive nightmare. When end users want access to data from multiple sources and want to be able to transfer data between different hardware

environments and between different software products, there can be a multitude of problems caused by the inflexibility of the hardware and software. In essence, this calls for a high level of *flexibility*.

End-user capabilities, however, must not only be flexible, but also must be *comprehensive*. In a developing information center, this means more than just having a wide range of choices. For example, on the hardware side, the end users should be able to choose from a wide range of compatible computers without affecting software choices. Further, it should be possible to select the best software products available and to operate in an environment that keeps the end users' options open.

The strong emphasis on flexibility and comprehensiveness of products, plus widespread education of the business community and advertised success, will take the information centers deeper into corporate life. Workstations will appear on more desks at different organizational levels. Requests for applications will come from new sources. The organization will steadily become more computer literate. Thus, today's information centers call for a highly flexible structure, a wide range of relevant software, links to the production data center, and a growth path free from compatibility or communications limitations.

A summary of the foregoing factors helpful in planning an overall strategy for a typical organization's information centers is set forth in Figure 2-1.

Figure 2-1

Factors Helpful in Planning an Overall Strategy for Information Centers

- *Integration of MIS department with information centers*—the emphasis is on the linkage of computer mainframes (under the direction of the MIS department) to microcomputers (under the guidance of the information centers) via data communications so that end users can access the data in the organization's databases.
- *Development of objectives for information centers*—the objectives center on matching the information center strategy to the organization strategy, applying tools to solve business problems in the organization's functional units, and being proactive, not reactive, in seeking opportunities from the end users' viewpoint that offer the greatest return to the organization.
- *Utilization of a phased approach over time*—the focus is on the need to go through three distinct phases of development: (1) start up, (2) growth and expansion, and (3) maturity in order to meet end-user needs over time.
- *Flexibility to meet changing times*—the emphasis is on being flexible, i.e., adaptable to meeting end-user needs in terms of hardware and software as times change plus considering the comprehensiveness of products so that the information centers can have more impact on everyday organizational activities.

PLANNING AN OVERALL STRATEGY FOR RESOLVING OR, AT LEAST, REDUCING COMPUTER CONFLICT

Often forgotten but very present in the preceding discussion is the degree of computer conflict between IC professionals and end users. Due to the seriousness of this conflict, this section first examines these problems as perceived by IC professionals, then by end users. The purpose of this discussion is to set the stage for further discussion of this important topic in future chapters of the text, in particular, in the latter part of the text where the accent is on integrating the interests of IC professionals and end users along with appropriate guidelines for IC professionals and end users from a managerial perspective.

Problems As Perceived by IC Professionals

First and foremost among the list of computer conflict problems is the perception by IC professionals that their control over organization-wide computing activities is threatened. Unlike the territorial dispute between the MIS department and the information centers, this much broader affront centers on the upsurging of their professional status in the organization. The thinking goes something like this: "If end users perform many of the tasks that I did previously, my job as an IC professional is not as important or demanding as I thought." The user friendliness of hardware and software has made this possible; however, end users feel that IC professionals have pulled "the wool over their eyes" in the past. A high level of conflict can arise from this type of thinking on the part of end users.

A *second* problem, which is related to the first one, is the lack of appreciation of end users to understand the complexity of developing complex management information systems. Too often, end users feel that their own ability to develop systems and programs relatively quickly should be also applicable to very large and complex management information systems and programs. This has been and probably will never be true, even if some form of future artificial intelligence system is used.

The *third* computer conflict problem is frequently the by-product of the MIS department's built-in inertia. In many instances, the MIS department has not in twenty years changed in the way in which it is structured or the way in which it supports its users. Some MIS professionals are afraid of concepts like the information center. Only two or three years ago, they had total control of the organization in relation to MIS activities. That control has been or is now slipping away, and the information center is symptomatic of this erosion of control.

From another perspective on this prior problem, there is a *fourth* one. The vendors themselves are increasingly pushing the information center concept—often as a means for MIS to retain control and impose standardization on the use of computing capabilities throughout their organizations.

IBM, which has promoted the information center concept more than anyone else in the field, is a case in point. IBM is marketing the information center as a structure to impose around the end users. It gives the users some say in what equipment they buy, and it keeps them from running helter-skelter in putting on new applications and using outside services. On the other hand, end users may prefer other makes of computer equipment, which can be a major cause of conflict.

Fifth, there is a rush to implement the newer fourth- and fifth-generation programming languages, computer graphics, and similar items via information centers for end users. However, there is a lack of computer professionals to staff the centers. For example, end users making use of an information center should be able to get information on a wide range of computing services. However, many end users, such as finance and human resources managers, have a very pressing need for certain tools in their areas of interest. Both areas, as an example, have significant ad hoc processing requirements for items like budgetary reports or fringe benefits analyses. Hence, they need help in these specialized areas which may not be forthcoming from the information center—another possible source of conflict.

A *sixth* major computer conflict problem is caused by the lack of compatible hardware and software. This lack of standardization has plagued and confused IC managers from the beginning. Each brand has its own unique operating system and its own variation of BASIC language for programming. Although they are similar, a TRS-80 program cannot necessarily run on an Apple IIe. And just as CP/M is being declared a "de facto standard" by the micro world, along comes another promising operating system such as UNIX, developed by Bell Laboratories. In addition, incompatible microcomputers present other problems. Often, various departments sneak micros through on their budgets. The unrestrained growth of micros breeds additional incompatibility.

With the incompatibility of hardware and software throughout the organization, comes a *seventh* problem for potential conflict, namely, audit control. In the haste to give end users microcomputers, many organizations fail to evaluate who will be using the micros for how long and for what purposes. As a result, a segment of a company's work force is performing work that cannot be traced. Needless to say, that work can be easily lost through theft or a natural disaster. A lack of consistency in organization-wide microcomputer use is a companion problem not only with the lack of an audit control, but also with other problems. For example, in large corporations, several departments duplicate efforts in developing micro software or micro-to-mainframe links. The result is usually several microcomputer systems that cannot communicate with each other. As another example, there is lack of data integrity in the organization, that is, the data stored on the various micros do not always agree with one another, not to mention with the data stored on the organization's central or distributed databases.

Closely related to the foregoing problem is an *eighth* one where end users might not do a good job of designing, coding, debugging, or documenting their systems. Even if the end users know what they are doing, without central controls, every department will program differently, with resulting waste, duplication of effort, and lack of portability. Standardization among microcomputers is nonexistent. For example, programs written for an Apple IIe will not run, without modification, on a TRS-80, and assembly language programs for the two are as different as those written for Control Data Corporation and IBM mainframes. Many information centers will also find the predominant languages on micros, BASIC and Pascal, different. The unspoken concern is that IC professionals will be asked to help salvage end users' projects when they get into trouble.

Ninth is the cost of the mainframe system versus the microcomputer system. Sometimes, the cost is lower with a mainframe, especially for straightforward applications that require very little development time in terms of the MIS department's systems and programming effort. Typically, the end users look only at the hardware costs of a micro and its peripherals while leaving out the other costs for software, maintenance, operations, and so on. Based upon research results, the costs for micro hardware is approximately 20 percent while the other costs are about 80 percent. For example, to install a \$5,000 microcomputer and peripherals, approximately \$20,000 must be added for other costs. Thus, the total investment in a typical microcomputer is approximately \$25,000 versus the cost of a cathode ray tube (CRT) terminal for the end user and the MIS department's developmental costs.

A summary of the foregoing typical computer conflict problems as perceived by IC professionals is set forth in Figure 2-2.

Problems As Perceived by End Users

Just as a host of computer conflict problems is perceived by IC professionals, end users also perceive a special set of problems. Underlying many of the conflict problems is the fact that micro computing stirs emotions among end users and pulls extreme reactions from otherwise reasonable corporate managers. On one hand, using a personal computer to leverage the work of one's mind is, as its name states, personal. Ideally, the individual employs the computer to translate ideas and information into intricate structures of intelligence, a process as intimate as thinking. On the other hand, an organization may understandably fear that the power of these computers and other personal-computing tools, if not carefully controlled, will not fully support organization goals. The very nature of end users in going their own separate ways generally leads to computer conflict problems if they are not properly guided by corporate management.

Typically, the *first* problem encountered from an end-user viewpoint that ultimately causes computer conflict is the lack of knowledge about

Figure 2-2

Typical Computer Conflict Problems As Perceived by IC Professionals

1. IC professionals feel that their territory is being threatened by end users because more user friendly hardware and software makes it appear that their jobs are not important or demanding.
2. The lack of appreciation by end users in understanding the complexity of developing complex information systems can infuriate IC professionals.
3. The MIS department has a built-in inertia not to change its structure, particularly in light of the new information centers being established in many organizations today. The rationale is that the MIS department will lose control over computing.
4. The information center concept, heavily promoted by IBM, is a way for the IBM PCs to enter the organization gracefully without the approval of the MIS department. However, end users may prefer other makes of microcomputers.
5. The rush to implement new information centers is causing problems because of a lack of adequate IC professionals to staff these centers.
6. The lack of compatible hardware and software throughout the typical organization is valid grounds for the IC professionals' concern about communicating not only with computer mainframes but also with other microcomputers.
7. Incompatible hardware and software, lack of audit control, lack of communications capability, and incompatibility of data can be the basic causes of organization-wide micro misuse.
8. The lack of standardization of microcomputer programs by end users versus those written by computer professionals in a mainframe environment can cause a considerable amount of conflict.
9. Although the cost of using a microcomputer is generally lower, comparable costs on a computer mainframe can be lower—a fact that may be quite obvious to an IC professional but not to an end user.

computer hardware and software. To acknowledge one's lack of computer expertise when the individual is highly regarded for his or her knowledge in another area of an organization is hard for the end user to do. To start out as a novice is a traumatic experience for many end users. Compounding this problem, many times, is the lack of compassion by IC professionals for end-user traumas. Hence, initial encounters may occur between the IC professionals and end users that have short- and long-run repercussions on the effective usage of microcomputers as well as computer mainframes. In turn, these initial encounters set the stage for many of the conflict problems to be explored below.

Closely linked to the preceding problem is a *second* one, that is, a lack of knowledge of what hardware and software are needed to solve the many problems facing the end-user manager and his or her staff. Because many

of the problems do change periodically, the software packages and programs that are best suited today and tomorrow confront the end user. A long dissertation by someone at the typical information center tends to confuse rather than clarify the proper direction for the end user. Instead of helping the user, the net result is generally a misguided approach for the user to follow.

A *third* computer conflict problem is the misunderstandings by end users that result from upgrading the microcomputer software packages, the computer equipment, and so on. End users perceive the upgrades as the answers to many of their problems when, in reality, this seldom is the case. A software or hardware upgrade should be treated as additional capability of the program or equipment and not as an answer to the current problems facing end users.

Closely related to the prior problem is the *fourth* one, namely, the inability of the information centers to tell end users what it expects to offer in terms of computer hardware and software typically one year and beyond. As one MIS manager stated about its information centers, "When we went in to set up the information centers, we hadn't the foggiest idea of how much we'd grow." Fortunately, the selected hardware gave the organization the ability to grow in small increments to almost any capacity needed. Moreover, the software environment was comfortable for large databases, and the machine's high reliability was also important. However, this may not be the case as evidenced by feedback from end users in other organizations.

A *fifth* problem is the incompatibility of microcomputers and its software with mainframe capabilities, that is, they cannot communicate with each other. End users, not knowing the intricacies of micro and mainframe technology, feel that no matter what micro hardware and software is used, it will communicate easily with the mainframe, especially when large amounts of data are needed from the home office or distributed databases around the country. If the MIS manager has provided for this tie in by allowing only certain types of micros to be purchased, along with the appropriate software, there is no problem when the time comes to tie in with the mainframe and their databases. Currently, however, this approach had not been enforced for the most part, resulting in a wide range of incompatibility problems.

Because the microcomputer is often looked upon as a means of solving an immediate problem that the MIS department cannot solve as rapidly, there is a *sixth* problem of looking only at the short range and not the long range, or, to put it another way, the approach is one of "being penny wise, but pound foolish." Frequently, the end user has a specific application, such as spreadsheet calculations or some specialized analysis, that can, as the individual sees it, justify the cost of a micro all by itself. The purchase of the micro without interacting with IC professionals or the information center is a needless cause of computer conflict in many organizations

today. Too often, end users rely upon the sales pitch of vendor salespersons only to find later that they should have gone in a different direction in terms of the micro technology acquired.

A *seventh* problem is one of training. What may be great for one user may be a disaster for some other user. Although software tutoring programs are in wide usage, they tend to be boring to some end users. More importantly, the information imparted in the training process may not be the information that the end user needs to know to be successful in his or her specialized application. A feeling of frustration can set in. Overall, a high level of anxiety can be experienced by the end user.

Closely tied to two of the foregoing conflict problems is an *eighth* one. Even if an organization successfully connects incompatible machines, it may be adding to its training headaches. The time that end users need to learn a new technology represents a loss of productivity. It usually takes a week for a user to become proficient with a new piece of micro software. Despite these training concerns, organizations tend to vacillate over the kind of micros they will support. One large bank, which had an Apple users group with hundreds of members, announced that in the future it would support only the IBM PC—it would buy only PC-compatible software and provide training exclusively on that machine. Although the end users were allowed to continue with applications already in place on their Apples, many were distressed by the new directive. In fact, several managers who had been instrumental in developing Apple applications left the company as a result of the edict.

Last, but not least, the *ninth* computer conflict problem relates to user friendliness. If the micro technology is very user friendly, it is possible that end users will be so enticed by the computing segment of their jobs that they will neglect other important tasks. Corporate managers, for example, fear that the engineer who loves to make plots using graphics software will spend too much time making plots and not enough time on engineering tasks. Potential for wasted time, then, is large as end users explore the capabilities of their personal computing tools. From this perspective, the end user is spending too much of the IC professional's time, thereby being a source of potential conflict over time.

For a summary of the preceding typical computer conflict problems as perceived by end users, see Figure 2-3.

PLANNING OF INFORMATION CENTERS FOR THE COMING YEAR

In order to plan effectively for the coming year in typical information centers, it would be helpful first to see where they are today. Computer Intelligence recently released the findings of its second annual *Information Center Survey*, which yielded some interesting data on where ICs are today and the direction in which they are going. The firm surveyed 600 IBM

Figure 2-3

Typical Computer Conflict Problems As Perceived by End Users

1. The lack of knowledge about microcomputer hardware and software is highly traumatic for end users, especially when they are highly regarded for their expertise in another area of the organization.
2. Closely related to the prior problem is the difficulty of knowing what software packages and programs are best suited to answer end-user problems which tend to change periodically over time.
3. Misunderstandings arise from upgrading the microcomputer hardware and software. Too often, end users see the micro technology upgrades as the answer to their current problems when this is generally not true.
4. The information center is unable to tell end users what microcomputer hardware and software will be offered next year and beyond.
5. The incompatibility of microcomputer hardware and software with the mainframes is not widely known by end users when they acquire micros on their own.
6. Micro technology is acquired to solve one or more immediate problems without considering the long run to answer a wide range of problems confronting the end users today and in the future.
7. Training provided for end users does not always serve their needs since training needed for specialized applications is not provided.
8. The training problem is further complicated by the fact that software for a particular microcomputer takes a week for end users to learn, thereby causing concern among end users about the need to learn even more computer technology.
9. The user friendliness of micro technology might cause end users to neglect their everyday tasks for learning the intricacies of a certain software package. This long lapse of time can be a source of conflict with IC professionals.

and plug-compatible mainframe (PCM) IC sites to collect information on both host mainframe and personal computer systems. To offer a brief overview of the current state of software use in information centers, 73 percent of mainframe sites reported using a database management system (DBMS), 61 percent employ an information retrieval method, 56 percent utilize graphics software, and 53 percent have a statistical analysis system. For personal computers, software use favors integrated software (88 percent), word processing (86 percent), micro DBMS (77 percent), and graphics (55 percent).²

Based upon this research data, one may conclude that information centers are employing mainframe computers primarily to access corporate information and aid in performing data-intensive analysis and display function. In contrast, PCs are helping users to perform operational tasks, manage information, and process text. Beyond this distinction, however, exists a number of less distinctive divisions. Mainframe and PC software

found in information centers is taking on a homogeneous appearance. These current trends also appear to be indicative of the future. Thus, these research results provide a basis for developing information center budgets.

Development of Information Center Budgets

A budget plan for the typical information center is composed of cost projections for facilities, staff, and other resources in the IC plan. The way in which the information center budget is developed depends on whether an information center is just being started or is an ongoing operation. If one is at the planning and cost-justification stage, the plan requires a considerable amount of analysis and projection. Once the information center becomes operational, however, business planning is largely a budgetary process.

For each resource described in the budget plan, the quantity, schedule, and cost should be determined. A typical plan discusses the following: (1) the number, professional level, salary, and fringe benefits of the staff; (2) space allotment (including cost basis) and construction needs plus equipment hardware, peripherals, and furnishings; (3) software, including such items as spreadsheets, word processing, fourth-generation languages, and books and journals; and (4) training for the IC professionals and end users, including in-house workshops, outside seminars, computer-based training, and multimedia courses. A sample cost projection for a new information center is found in Figure 2-4.

Determining the budget for an operational information center requires modification of the items in Figure 2-4. The one-time acquisition costs for category 2, namely, facilities and equipment, must be dropped; however, the yearly depreciation must be picked up. Also, most of the costs for category 3, namely, software, can be dropped. Hence, the outlay for an operational information center is lower than the start-up costs for a new information center.

DEVELOPMENT OF INFORMATION CENTER QUESTIONNAIRE

Once plans have been set in motion for the information centers of a typical organization, there is a need to go a step further to determine whether they have been successfully accomplished. In a similar manner, there is a need to look at other areas of the information centers, like hardware and software, organization, staffing, training, control, and security issues. One way to assess their accomplishments is to utilize a questionnaire. Due to the importance of such a questionnaire, its major elements are set forth in this section of the chapter. However, before looking at the detailed part, which is the subject matter for part of the entire text, the nature and purpose of the information center questionnaire are first examined.

Figure 2-4
Sample Cost Projection for a New Information Center Stated on an Annual Basis

(1) Staff:		
1 manager	\$40,000	
2 technical specialists	70,000	
1 trainer	35,000	
1 secretary	25,000	
Fringe benefits (25%)	<u>42,500</u>	
Subtotal		\$212,500
(2) Facilities and Equipment:		
One-time costs:		
Equipment	\$35,000	
Furniture	10,000	
Construction	<u>5,000</u>	
Subtotal		50,000
Ongoing costs:		
Monthly rent (1,500 sq. ft. @ \$1/sq. ft.)	\$1,500	18,000
(3) Software:		
Spreadsheet packages	\$2,000	
Word processing	1,000	
Fourth-generation languages	30,000	
Books and journals	<u>500</u>	
Subtotal		33,500
(4) Training:		
Seminars	\$12,500	
Custom course development	15,000	
Purchased courses	<u>10,000</u>	
Subtotal		<u>37,500</u>
Total annual cost		<u>\$351,500</u>

Purpose of IC Questionnaire

The primary purpose of the IC questionnaire is to aid such reviewers as internal auditors and consultants to perform a comprehensive audit of the organization's information centers that are complementary to the MIS department. The questionnaire focuses on appraising the accomplishment of IC objectives in the areas of systems, programming, and operations; the ability of IC management to perform their assigned functions of planning, organizing, directing, and controlling in their assigned areas; and the adequacy of IC managerial decisions and actions in moving toward stated objectives. Hence, its questions appraise the management of IC resources.

Going beyond an appraisal of managerial capabilities, a secondary purpose is to appraise the adequacy of controls over IC operations and their

operating procedures. The questionnaire also informs management of operating problems that need to be corrected for greater efficiency and economy of operations. Within this framework, IC personnel, operating policies, computer facilities, and the operating environment are reviewed in terms of their contribution (or lack of contribution) to operating efficiency or cost savings. A secondary purpose of the IC questionnaire, then, is to evaluate the efficiency of operational activities in the information centers.

Inclusion of both the managerial and operational aspects provides a logical framework for a thorough and comprehensive evaluation of any information center. Evaluating both aspects leads to improved operations in most areas. In addition, because managerial and operational activities are complementary and supplementary to one another, they should be treated as such.

Major Sections of IC Questionnaire—Part I through Part VI

The major sections of the IC questionnaire, set forth in Figure 2-5, include the following six parts:

- Part I—Planning an overall strategy for information centers (Chapter 2)
- Part II—Hardware and software integration (Chapter 3)
- Part III—Organization of information centers (Chapter 4)
- Part IV—Staffing of information centers (Chapter 5)
- Part V—Training of end users (Chapter 6)
- Part VI—Control and security over information centers (Chapter 7).

The detailed parts of each major part of the IC questionnaire along with specific questions will be set forth in this text, starting in this chapter, that is, planning on overall strategy for information centers.

Recommendations Based on Using IC Questionnaire

As will be seen in this chapter and future ones, the IC questionnaire does not give answers but simply asks questions. If the questions are all answered "yes," the function or area under investigation is operating as desired; if there are some "no" answers, the function or area is experiencing difficulty, and the negative answers must be expanded upon in writing. If the question does not apply, the "N.A." (not applicable) column is checked. The questionnaire serves as a tool to analyze current IC activities. More importantly, it allows the auditors and consultants to synthesize those elements causing difficulties and deficiencies. The capability to assess all negative answers helps to separate real problems from symptoms.

Figure 2-5

Major Parts and Sections of the Information Center Questionnaire

Part I—Planning an Overall Strategy for Informations Centers

- Section A. Overall IC Planning Considerations
- Section B. Information Center Plans
- Section C. Information Center and End Users
- Section D. Microcomputer Plans
- Section E. Microcomputer Policies

Part II—Hardware and Software Integration

- Section A. Overall IC Hardware and Software Considerations
- Section B. Hardware Justification and Selection
- Section C. Hardware Procurement, Implementation, and Support
- Section D. Software Factors
- Section E. Software Vendor Packages

Part III—Organization of Information Centers

- Section A. Overall IC Organizational Considerations
- Section B. IC Organization Structure
- Section C. Organization of IC Professionals to Assist End Users
- Section D. Organization of Information Center Committee
- Section E. Organization of End User Groups

Part IV—Staffing of Information Centers

- Section A. Overall IC Staffing Considerations
- Section B. Linkage of Corporate Culture to IC Staffing
- Section C. Information Center Staffing
- Section D. Training of Information Center Professionals
- Section E. Motivation of Information Center Professionals

Part V—Training of End Users

- Section A. Overall IC Training Considerations
- Section B. Managing In-House IC Training Programs
- Section C. Delivering In-House IC Training Programs
- Section D. Staffing In-House IC Training Programs
- Section E. Evaluating In-House IC Training Programs

Part VI—Control and Security over Information Centers

- Section A. Overall IC Control and Security Considerations
- Section B. Information Center Control
- Section C. Microcomputer Control
- Section D. Security over Information Centers
- Section E. Security over Microcomputers

Once the auditors and consultants have diagnosed the real problems and the difficulties and deficiencies surrounding them, they are ready to assess the level of performance for the function or area being investigated. Many times, performance is far below expectations. Thus, recommendations have a basis from which to make an oral presentation and a written report to improve operations. This approach will be evident in the master case study of this text, namely, the ABC Corporation.

PART I OF IC QUESTIONNAIRE—PLANNING AN OVERALL STRATEGY FOR INFORMATION CENTERS

Part I of the IC questionnaire centers on assessing the effectiveness of planning for information centers. The focus is on short-range to long-range plans, especially the coming year's IC budget. Questions look at the relationship of the information centers to corporate management's capability to meet end-user needs today and tomorrow. Emphasis is also placed on the information centers doing everything in their power to assist end users when considering the preparation of this year's IC budget. Essentially, questions assess how IC professionals have performed their planning function—a most critical factor that can be an underlying cause for friction between the IC professionals and end users. The lack of attention to the proper level of planning, then, may be the prime cause of computer conflict in an organization, or it may be only a symptom of important problems facing the management of information centers.

Major Sections of IC Questionnaire—Part I

For this chapter which basically centers on planning an overall strategy for information centers, the major sections—as set forth in Figure 2-6—are as follows:

- Section A. Overall IC Planning Considerations
- Section B. Information Center Plans
- Section C. Information Center and End Users
- Section D. Microcomputer Plans
- Section E. Microcomputer Policies.

For the above sections of Part I, a thorough reading of the questions in Figure 2-6 indicates that corporate management is to be held responsible and accountable for their actions as related to the organization's information centers. In essence, their attitudes and opinions about the organization's ICs are reflected in the answers to these questions. An overall positive response indicates that corporate management wants the information centers to succeed, thereby improving the effectiveness of end users as

Figure 2-6

Part I of the IC Questionnaire—Planning an Overall Strategy for Information Centers

	Yes	No	N.A.
Section A. Overall IC Planning Considerations:			
1. Does corporate management consider the computing needs of end users as a starting point in its planning of an overall strategy for the information center?	_____	_____	_____
2. Is there a well-thought-out and developed plan by corporate management that centers on an overall strategy for the information center?	_____	_____	_____
3. Is there an overall strategy under the direction of corporate management to resolve or, at least, reduce computer conflict as perceived by:			
a. IC professionals?	_____	_____	_____
b. End users?	_____	_____	_____
4. Is corporate management aware that each time an information center is established that supports a multitude of microcomputers, it is creating a micro data center, subject to all of the calamities that can occur in a typical mainframe environment?	_____	_____	_____
5. Does corporate management attempt to identify potential micro end users in its overall strategy to planning?	_____	_____	_____
6. Is this attempt by corporate management to identify potential micro end users construed in a positive manner from their standpoint?	_____	_____	_____
7. Does the coming year's budget (i.e., short-range plans) have sufficient funds to meet needs of end users using an information center?	_____	_____	_____
8. Is an increasing percentage of the computing budget being allocated to meet future needs of end users using an information center?	_____	_____	_____
Section B. Information Center Plans:			
1. If the information center had growing pains in the past, have they been overcome to a large degree?	_____	_____	_____
2. Are there plans to rectify the current problems of the information center?	_____	_____	_____
3. Is the information center's budget an integral part of the coming year's MIS departmental budget?	_____	_____	_____
4. Is sufficient microcomputer and computer mainframe capacity available currently to meet information center needs?	_____	_____	_____
5. Is the information center's budget an integral part of the long-range plans of the MIS departmental budget?	_____	_____	_____

Figure 2-6 (continued)

6. Is sufficient microcomputer and computer main-frame capacity being planned to meet future information center needs?

Section C. Information Center and End Users:

1. Is there a policy set forth by corporate management in effect that ensures that end-user needs are met by the information center?
2. Does the information center acquiesce to the present needs of the end users?
3. Does the information center acquiesce to the future needs of end users?
4. Is there adequate feedback from end users to corporate management and/or MIS management regarding the capability of the information centers to meet their needs?
5. Is there a tie in of information center management with office automation management (charged with updating office equipment, methods, and procedures) so that "the right hand knows what the left hand is doing?"

Section D. Microcomputer Plans:

1. Has the acquisition of microcomputers been evaluated properly for inclusion in the coming year's information center budget?
2. Is there sufficient agreement between the information center and end users regarding the number and amount allocated to microcomputers for the coming year's information center budget?
3. Is the coming year's information center budget sufficient to cover the acquisition of microcomputers as deemed necessary by IC professionals and end users?
4. Is the coming year's information center budget sufficient to cover the acquisition of software from outside vendors as deemed necessary by IC professionals and end users?
5. Is the coming year's information center budget sufficient to cover the acquisition of expenses other than hardware or software, i.e., operations, maintenance, and similar items?

Section E. Microcomputer Policies:

1. Is there a microcomputer policy (established and backed by corporate management) in effect that holds end users responsible for their own personal computing?

Figure 2-6 (continued)

2. Is the microcomputer policy easy to implement from the end users' standpoint? _____
3. Is there a microcomputer policy in effect that allows end users to play an important role in the initiation of the request for microcomputers? _____
4. Is there a microcomputer policy in effect that assists end users in solving specific problems that are logically oriented toward microcomputer solution? _____
5. Is there a microcomputer policy in effect that addresses the problem of using microcomputers to solve problems that they were never intended to address? _____

well as their productivity on the job. In contrast, a negative response to these questions indicates that the information centers will have a difficult time meeting their stated objectives of assisting end users in their day-to-day activities.

Underlying Part I of the IC questionnaire is the notion that the technology from the organization's information centers should play a large role in both the context and the process of the organization's business; that is, in determining which markets to enter and in improving the methods for implementing short- to long-term strategies. The organization can direct information technology toward virtually any corporate goal, including reaching more customers, boosting quality control, or operating more efficiently. Using information center technology strategically requires new perspectives. In addition to learning the strategic importance of software tools, end users are following the shift from the mainframe-oriented MIS shop to the end-user-oriented "smorgasbord" of computing technologies via information centers.

ABC CORPORATION—PLANNING AN OVERALL STRATEGY FOR SUCCESSFUL OPERATIONS

The ABC Corporation, introduced in Chapter 1, has an information center located at central headquarters as well as information centers located at each of the four manufacturing plants with attached warehouses. Each information center is staffed with three IC professionals plus a secretary. The information centers provide a wide range of services. An integral part of these services is providing support to end users in ordering, installing, and maintaining microcomputers. After helping to justify an application, the center recommends a specific hardware and software configuration and then helps the end user complete a purchase order, which is

signed by the end-user department manager, processed through normal company channels, and sent to one of several local dealers. The dealers assemble the equipment prior to delivery and later provide maintenance for all components in the configuration. When the equipment is delivered, the information center installs it and configures the software as needed. The center's installation service helps the end users and also keeps the center in contact by tracking what equipment and software are in place.

Planning Problems of Current Information Centers

Before taking a closer look at the corporation's five information centers using Part I of the IC questionnaire, it would be helpful to set forth the corporation's current problems, which, essentially, center on information center staffing problems and a conflict between the MIS department and the information centers as well as a conflict between the end users and the information centers.

Information Center Staffing Problems. Within each of the information centers is a staffing problem. Qualified candidates are indeed scarce. Because of their qualifications and the diverse experience gained from being part of the information centers, these people are highly marketable to other organizations. Consequently, there has been extensive staff turnover, i.e., 50 percent per year. Typically, IC professionals have moved on to other firms in about two years. Since careful planning and preparation is needed to staff a center, corporate headquarters has begun to identify candidates six months to a year ahead of their planned move and to place them in interim positions to refine their skills. Nonetheless, the personnel shortage persists.

Conflict between the MIS Department and the Information Centers. One of the biggest problems causing conflict when the information centers first began operations resulted from the fact that the computer professionals from the MIS department did not understand the MIS department's role and its impact upon the computing organization. Suddenly, new "upstart units" were competing with the traditional MIS application developers and, even worse, were fast becoming the initial point of contact within the MIS department for a majority of end users. Recommendations were being made to end users without any regard for the conventional development work being done by the rest of the organization. No one in the department had foreseen the possibility of conflict.

This situation is particularly troublesome to the MIS staff members—known as functional coordinators—who have insight into a single business function, such as plant production control or plant cost accounting. They work in a planning mode with the management of those functions and are well respected by them. Their role is to ensure that current computing technology stays responsive to business needs. The information centers' competing role caught them by surprise. Obviously, this

created conflict. Once the conflict was identified, the following two ways were discussed to ease the friction. The first was to educate the MIS department about end-user computing. The goal was to assure the functional coordinators and line managers that the information centers dealt only with computing tasks that could be accomplished without MIS professionals. In fact, it was pointed out that the centers would be a help to the traditional organization by identifying end users in need of computing services. Second, the information centers scheduled regular meetings with MIS management and functional coordinators to keep everyone up to date.

Conflict between the End Users and the Information Centers. A major underlying cause of the computer conflict between end users and the information centers has been caused by the way in which they were originally organized. The information centers were the brainchild of the corporation's executive vice president and were mandated by corporate managers and their staff behind the end users' backs. As a result, end users felt that the information centers were forced upon them. Hence, many end users are suspicious of the information centers as now installed. They either reject outright the efforts of the information centers or fight with the IC professionals when using them. Needless to say, this conflict has not helped reduce the turnover of the information centers.

Related to the foregoing conflict are a number of other factors that are causing tension. Referring to those set forth earlier in the chapter, end users prefer other makes of microcomputers than those recommended by the information centers. Because of the friction between the end users and the information centers, some micro technology has been purchased that does not tie in with the computer mainframe. In such cases, the end users do not want the information centers looking over their shoulders. Hence, there is a lack of control and security over certain micro hardware and over the data being used to make managerial decisions.

Too often, end users tend to acquire a certain microcomputer for a certain application without consideration for other applications in the future. This is quite noticeable to members of the information centers. They feel that end users are too shortsighted in their applications. There is a tendency to be "the first one" without regard to the long-term effects of what they are doing.

The IC professionals of the information centers have found that conflict with end users arises from the most unexpected sources. The five information centers were supporting a widely used micro spreadsheet with plans to change to an advanced version in a few months. Consequently, the centers paid only passing attention to the introduction of Lotus 1-2-3. A senior manager from one of the user departments saw a demonstration of 1-2-3 at a business conference. The vendor even provided him with a copy of the demonstration diskette, which he brought back to the office and distributed to other departments. The information centers found out about activity only when he and another department manager demanded that

future spreadsheet training be done on Lotus 1-2-3 and not on the current product, thereby creating a flurry of activity that ultimately led to the realization that 1-2-3 was better at meeting end-user needs. In the past, the information centers handled the promotional efforts of traditional vendors, but it never expected a problem like this one.

As can be seen from the preceding discussion, a number of conflict problems face the ABC Corporation. Some of this conflict goes very deep despite the good efforts of the IC professionals. Much of the resentment of the five information centers is still found throughout the corporation because many of the end users feel that they are outsiders. To overcome or, at least, reduce this conflict to a manageable level, the material below plus future chapters will explore an appropriate strategy. A definitive solution will be left until that time.

Evaluation of Planning Problems of Current Information Centers

Based upon the above information, i.e., the services offered by the current information centers and their related problems, there is a need to study these centers with a view to developing effective plans for today and tomorrow. To assist in this undertaking, Part I of the IC questionnaire is employed. More specifically, the "no" answers that assist in illuminating planning weaknesses have been set forth in Figure 2-7 (the answers can be referenced to Figure 2-6). An evaluation of these negative answers provides a means for offering recommendations in the next section to the appropriate levels of management.

In Section A, Overall IC Planning Considerations, several questions have been answered negatively. In terms of question 2, even though there is an overall planning strategy for the corporation's information centers, the plans as developed tend to meet more of the end users' needs rather than IC professionals' needs. This strategy per question 3 tends to increase conflict between IC professionals and end users as opposed to resolving or, at least, reducing computer conflict. Reference can also be made to the preceding discussion on the conflict going on in the corporation since the information centers were established. Regarding questions 7 and 8, the coming year's budget for the five information centers falls short of meeting the needs of the IC professionals although they do meet the needs of the end users. Also, an increasing percentage of the MIS budget is not being allocated to meet future end-user needs because there is still a need to use more fully the present capabilities of the information centers.

Questions 1 and 2 in Section B, Information Center Plans, which have been answered "no" center on the ICs' growing pains; that is, experienced MIS professionals have been shifted to the information centers with little regard for the needs of the MIS department. Currently, there are no plans to rectify this bad situation. In Section C, Information Center and End Users, the negative answer to question 4 indicates that little feedback is

Figure 2-7

Explanations for the "No" Answers in Part I of the IC Questionnaire—Planning an Overall Strategy for Information Centers (see Figure 2-6)

Section A. Overall IC Planning Considerations:

- A.2. The developed plan tends to focus more on meeting end-user needs at the expense of IC professionals. Some of the personnel resources of the MIS department have been directed to the information centers, thereby causing lateness of MIS computer projects.
- A.3a and 3b. Essentially, the current conflict is being ignored by corporate management at the expense of meeting the needs of IC professionals and end users.
- A.6. The identification of potential micro end users is now construed in a negative manner.
- A.7. The coming year's budget or short-range plans tend to meet the needs of end users and not those of IC professionals. This is evident in the present "pressure cooker" atmosphere of the MIS department, which will remain about the same in the coming year and beyond.
- A.8. An increasing percentage of the MIS budget is not being allocated to meet future end-user needs because of the need to use more fully the present capabilities of the information centers before moving on to bigger and better things. Currently, the information centers offer a wide range of computing services.

Section B. Information Center Plans:

- B.1. The information center has had growing pains in the past which have been overcome somewhat. However, it should be noted that they have been overcome at the expense of the MIS department. Experienced MIS professionals have been shifted to the information centers without regard to the present and future needs of the MIS department.
- B.2. Based upon the answer to the above question, no major plans are under way to rectify the current problems of the information centers.

Section C. Information Center and End Users:

- C.4. Due to the conflict problems going on between end users and the information centers, there is little or no feedback regarding the capability of the information centers to meet their needs.

Section D. Microcomputer Plans:

None of the questions were answered no.

Section E. Microcomputer Policies:

- E.5. Although IC professionals are capable of guiding end users in the type of problems that can be solved, many times they led end users down a "blind alley" due to the conflict existing between the two groups.

provided regarding the operations of the information centers by end users because of the present level of conflict discussed previously. Although all questions have been answered positively in Section D, Microcomputer Plans, there is still the problem of conflict underlying these plans. Finally, in Section E, Microcomputer Policies, question 5 needs to be explained; that is, many times IC professionals tend to mislead end users due to the conflict between the two groups. Thus, many of the "no" answers to Part I of the questionnaire can be attributed to the ongoing conflict.

Underlying this major conflict problem between IC professionals and end users is the fact that experienced MIS professionals have been transferred to the information centers while junior MIS professionals have been hired to replace them. Inexperienced personnel cannot take up the slack of experienced, transferred MIS personnel on the current computer projects. A very pronounced sense of frustration, then, has evolved toward end users, which is expected to continue as evidenced by the negative responses in Part I of the IC questionnaire. Overall, the IC departmental plans are less than ideal. The growing pains of the information centers have not been overcome to a large degree because MIS project managers see their experienced MIS professionals interacting with end users as consultants when, in reality, their talents could be better utilized on MIS computer projects. However, this is a somewhat different story when reference is made to end users.

Recommendations to Improve Information Center Planning

Three recommendations are made below to overcome the foregoing problems, that is, to improve information center planning: (1) the interaction of corporate management with MIS and IC management to develop appropriate plans, (2) the development of the IC strategic plan, and (3) the incorporation of a microcomputer policy as an integral part of the IC strategic plan. In addition, a number of other recommendations can be given, especially in regard to computer conflict. Such recommendations in the form of guidelines for corporate management, IC professionals, and end users will be found in Chapters 8, 9, and 10, respectively.

Interaction of Corporate Management with MIS and IC Management to Develop Appropriate Plans. The ABC Corporation, like most well-managed corporations, already has an overall corporate strategic plan in place; however, the corporate personnel responsible for developing corporate plans understand very little about information centers. It is therefore incumbent upon MIS and IC management to take the initiative and interact with corporate management about the implementation of their own strategic plans. While the plan will be computer oriented, it is imperative that any directions and strategies developed be supportive of those set at the higher corporate level. This first or highest level overall corporate strategic plan is related to the MIS and IC strategic plans in Figure 2-8.

Figure 2-8

Top-Down Approach to the Overall Planning Process Depicting Relationship among Corporate, MIS, and IC Management

Corporate Management—The Overall Corporate Strategic Plan. Statements of corporate objectives, goals, and approaches that establish the business direction and environment.

MIS Management—The MIS Strategic Plan. Statements of MIS objectives and approaches that establish the direction and environment of the MIS department and the information centers.

IC Management—The IC Strategic Plan. Major strategies, directives, and assumptions that support the objectives in the overall corporate strategic plan and the MIS strategic plan.

IC Management—The IC Operating Budget. Projected yearly costs and benefits of the projects and functions included in the coming year's IC budget.

Development of the IC Strategic Plan. Before the IC strategic plan can be developed and related to the overall corporate strategic plan and MIS strategic plan, there is a need to establish the length of the planning horizon. In a high-tech industry, two years may be about the limit of what can be envisioned with comfortable reliability, whereas in a very stable environment, such as the banking industry, a five- to ten-year planning horizon may be acceptable. For the ABC Corporation, however, a three-to five-year horizon seems to be more practical. It is compatible with other planning horizons in business and government and also seems to approximate the frequency of major technology injection into the corporation's information centers.

Building upon the time frame for the IC strategic plan, several questions need to be asked: What IC objectives, strategies, and policies can be derived from the overall corporate strategic plan? Who will participate and in what capacity? Who will review and approve the IC strategic plan? How will the IC strategic plan be organized? What will the IC strategic plan contain? The answers to these questions depend to a large extent on the size and structure of the MIS organization and the corporation, the degree of computerization of corporation functions, the previous track record of MIS in the corporation, and the nature of the corporation's products or services vis-à-vis new technology; however, answers to these questions are given below.

What IC objectives, strategies, and policies can be derived from the overall corporate strategic plan depends greatly on whether references to MIS are explicit, vague, or nonexistent in the corporate plan. Explicit strategies such as "decentralize MIS" must be taken at face value. Vague statements such as "enhance user productivity through increased use of

micros" can be interpreted to mean specific IC strategies, provided that they are still consistent with the original corporate strategy. For the ABC Corporation, reference is made to the form where explicit objectives, strategies, and policies are stated.

In regard to who will participate and in what capacity, certainly, the top MIS executive in the ABC Corporation must be the driving force. This individual should be the one who mandates and supports this process, providing overall direction and reviewing carefully and assessing the impact of each strategic decision before approval. This top MIS executive must be the principal communication link to corporate management outside the MIS organization, for it will be essential to gain that management's support. In addition, IC management should participate by making comments and suggestions after reviewing rough drafts.

In terms of who will review and approve the IC strategic plan, obviously corporate management, working with MIS and IC management, must approve both the process and the content. However, senior management of the corporation's operating units must also "buy in" to the entire planning process because it will be the operating units who will be required to participate in subsequent phases of the process and who will feel most of the impact of the plans in the form of the level and the quality of service from MIS and the information centers.

The question of how the IC strategic plan will be organized requires that some latitude be taken. However, the basic elements of the IC strategic plan can be defined as follows: goals, objectives, strategies, directives, and assumptions. Goals are the concise declaration of the overall purpose of the IC organization. Objectives are broad, timeless statements of direction: "Standardize all micro hardware throughout the corporation." Strategies are the specific methods or approaches to be employed in achieving a stated objective: "Promote standardization by installing one database management system." Directives and assumptions form the constraints and define the environment in which the IC strategic plan must be developed. Directives are explicit orders, usually from corporate management: "Maintain a ceiling on the staff levels in the IC organization." Assumptions are factors that are not explicitly stated but may be inferred from the corporate strategic plan or the general business situation. "Assume 10-percent growth for the next three years."

Finally, in regard to the factors to be included in the IC strategic plan, the most obvious subjects to be addressed are as follows: (1) the structure of the IC organization, (2) the hardware capacity and configuration, (3) microcomputer acquisition by end users, (4) new applications development, (5) productivity of end users, (6) distributed databases and data communications, (7) injection of new computer technology, (8) computer security, and (9) financial performance of the information centers.

The five basic questions discussed above are by no means inclusive, but they should serve as a useful starting point for developing specific objectives

and strategies. Specific answers to the foregoing questions go a long way toward the development of an IC strategic plan for the ABC Corporation. In turn, this plan has a bearing on the degree of conflict that will be experienced between IC professionals and end users. It is essential, then, that corporate management of the ABC Corporation review this plan not only from the standpoint of a tie in with the overall corporate strategic plan, but also in terms of lessening potential computer conflict.

A Microcomputer Policy As an Integral Part of the IC Strategic Plan. As indicated in the above discussion, policies must be explicitly stated. A microcomputer policy statement includes not only an overview, but also its essentials. Such a one for the ABC Corporation is set forth below.

The ABC Corporation recognizes the vast potential of microcomputers for improving productivity, reducing costs, and increasing its competitive edge. To avoid waste and inefficiency and to get maximum benefit from its micros, the corporation has set forth the following objectives:

- To apply microcomputer technology to opportunities that provide fast payback and quick return.
- To promote and coordinate applications of microcomputers to improve operational and business procedures and end-user services on a cost/benefit analysis basis.
- To foster cooperation and eliminate potential competition between end users of microcomputers and the existing MIS department and information centers by using appropriate software tools on an application-by-application basis.
- To encourage self-sufficiency among end users for recognizing business opportunities that may be exploited through microcomputers implementing cost-effective and timely solutions.

In order to achieve these microcomputer objectives, corporate management will oversee and act as a coordinator among the MIS department, the information centers, and the end users to support the use of microcomputers. A code of good practice will also be established for selecting hardware and software and for establishing fruitful areas for development. Not to be forgotten is the establishment of clear responsibilities for ensuring data integrity and report accuracy. Fundamentally, these broad mandates of corporate management are an important part of the IC strategic plan.

CHAPTER SUMMARY

Essentially, this chapter focused initially on planning an overall strategy for information centers. This strategy included consideration of improving productivity and a coordinated plan that will generate positive results for the entire organization. Next, four factors—integration of the MIS department with the information centers, development of objectives for the information centers, utilization of a phased approach for implementing the information

centers, and the flexibility to meet changing times—were set forth as a means for implementing an overall strategy in the planning of information centers.

In the next part of the chapter, emphasis was placed on planning an overall strategy for resolving or, at least, reducing computer conflict where a very important message should have been apparent. The power and influence once held by MIS is disappearing. To a function that operated virtually as a monopoly in organizations, the end-user revolt now under way has ominous portent. As indicated previously, this revolt is fueled by low-cost, high-power hardware and software that are readily available and user friendly. Facing the loss of prestige and power and spurred by a large financial commitment, MIS has frantically searched for some way to stall the revolt until it can regain control. The information center concept seems to be the "best game in town." Hence, the MIS department is the main force behind the emergence of typical information centers in organizations today and in the future.

In the final part of the chapter, planning of information centers for the coming year was presented from the standpoint of an annual operating budget. Also, the development of the entire IC questionnaire was discussed, followed by the detailed questions for Part I. To understand this first part of the questionnaire, it was applied to the ABC Corporation—the text's master case study.

NOTES

1. Wayne L. Rhodes, Jr., "The Application Backlog," *Infosystems* (November 1986): 8.
2. Randy Campbell, "Why Information Centers Are Demanding Standards," *Business Software Review* (March 1987): 48.

SELECTED REFERENCES

- Atre, S., *Information Center: Strategy and Case Studies*, vol. 1 (Rye, N.Y.: Atre International Consultants, 1986)
- Bartolik, P., P. Keefe, and B. Laberis, "If You Don't Have a Policy on Micros, You're in the Minority," *Computerworld*, August 29, 1983
- Bay, T., "MIS/DP Takes the Retail Route," *Computer Decisions*, March 12, 1985
- Beach, L., "Planning the Corporate Information Center," *Information Management*, June 1984
- Blank, E. E., "Strategies for Computer Literacy Development," *Information Management*, February 1985
- Branchau, J. C., D. R. Vogel, and J. C. Wetherbe, "An Investigation of the Information Center from the User's Perspective," *Data Base*, Fall 1985
- Brewer, T. A., and J. Eastburn, "Is the Information Center a Success?," *Management Information Systems Week*, February 20, 1985

- Campbell, B. W., "The Planning Side of Success for Micros," *Data Communication*, October 1984
- Campbell, R., "Why Information Centers Are Demanding Standards," *Business Software Review*, March 1987
- Carroll, H. S., "Corporate PC Strategy," *Information Center*, January 1985
- Casto, R., "The Operating Plan, Part Two," *Information Center*, December 1986
- Couger, J. D., "E Pluribus Computum," *Harvard Business Review*, September-October 1986
- Dunn, K. L., and D. R. Schuster, "Running the Information System Organization Like a Business," *Journal of Information Systems Management*, Spring 1986
- Garcia, B., "The Information Center Adapts to Corporate America," *Computerworld*, October 28, 1985
- Gerrity, T., and J. Rockart, "Wanted: Effective Leaders to Manage End-User Computing," *Computerworld*, September 8, 1986
- Guimaraes, T., "The Evaluation of the Information Centers," *Datamation*, July 15, 1984
- Halladay, M. E., "More Alike Than Different," *Information Center*, August 1985
- Harrar, G., "Information Centers, The Users' Report," *Computerworld*, December 26, 1983/January 2, 1984
- Head, R. V., *Planning and Implementing Information Resource Centers for End-User Computing* (Wellesley, Mass.: QED Information Sciences, Inc., 1986)
- , *Strategic Planning for Information Systems* (Wellesley, Mass.: QED Information Sciences, Inc., 1985)
- Hughes, G. M. K., "Formulating a Micro Policy for Your Company," *Computerworld*, September 26, 1983
- Johnson, F. E., "Installing a Solution Center: Thinking Big, Start Small," *Infosystems*, June 1985
- Karten, N., "How to Deal with Difficult Users," *Information Center*, May 1985
- , "Reshaping the Info Center," *Computerworld*, October 8, 1986
- Knight, B., "Info Center Concept Enters Middle-Age," *Software News*, October 1985
- Lasden, M., "Working out a Winning Strategy," *Computer Decisions*, March 15, 1984
- McCartney, L., "The New Info Centers," *Datamation*, July 1983
- Marks, W. W., "Strategic Planning for the Information Center," *Information Center*, August 1985
- Meyer, N. D., "Info Centers: OA [Office Automation] Retail Shops," *Today's Office*, October 1984
- Michtom, J., "Does Your IC Measure Up?," *Information Center*, August 1985
- Micossi, A., "MIS Executives Ponder the End-User Question," *Computer Decisions*, December 16, 1986
- Mikita, R., "Toward a Strategic Info Center," *Computer Decisions*, December 22, 1985

- Murray, J. P., "Develop Your Information Center in Phases," *Computerworld*, February 27, 1984
- Needle, S., "Large Firms Keep Count on Micros," *Computerworld*, February 18, 1985
- Oglesby, J. N., "How to Shop for Your Information Center," *Datamation*, June 1, 1987
- Paller, A., "Million-Dollar Graphics," *Computerworld*, April 21, 1986
- Paul, L., "Opening Door to the Information Center the First Step," *Computerworld*, January 28, 1982
- Reilly, D., "Info Center Requires Careful Planning," *Computerworld*, August 22, 1983
- Rhodes, W. L., Jr., "The Information Center Extends a Helping Hand," *Infosystems*, January 1983
- , "The Information Center: Harvesting the Potential," *Infosystems*, November 1985
- Richardson, M. J., "Marketing the Information Center," *Computerworld*, September 19, 1983
- Ross, K., "Justify, Justify, Justify," *Information Center*, March 1987
- Schwartz, A. P., "Keeping Time and Measuring Productivity," *Information Center*, May 1987
- Shidal, J. G., "Advice for the Budget Bound," *Information Center*, March 1986
- Stibbens, S., "Microcomputers: Friend or Foe of the MIS Manager?," *Infosystems*, October 1982
- Taylor, L., "39 Questions to Successful System Development," *Information Center*, February 1985
- Winemiller, B., "Mapping the Route to Success," *Information Center*, November 1985

3

PLANNING FOR HARDWARE AND SOFTWARE INTEGRATION

ISSUES RAISED AND EXPLORED

- To explore the relationship between microcomputers and improving the productivity of end users.
- To examine the basics for planning the acquisition and implementation of micros by end users.
- To discuss the important considerations when planning micro software for utilization by end users.
- To set forth Part II of the IC questionnaire to evaluate hardware, software, and their integration.
- To apply this second part of the questionnaire to the ABC Corporation in order to define further its planning problems.

OUTLINE

Introduction to Planning for Hardware and Software Integration

Utilization of Microcomputers to Improve Productivity

Current Uses of Microcomputers

Relationship of Microcomputers to Productivity

Future Capabilities of Microcomputers

Planning of Microcomputers by Information Centers for End Users

Micro Justification and Selection

- Micro Procurement, Implementation, and Support
- Planning of Micro Software by Information Centers for End Users
 - Software Considerations
 - Software Vendor Packages
- Integration of Hardware and Software Planning by Information Centers
- Part II of the IC Questionnaire—Hardware and Software Integration
 - Major Sections of IC Questionnaire—Part II
- ABC Corporation—Planning for Hardware and Software Integration
 - Hardware and Software Planning Problems
 - Evaluation of Hardware and Software Planning Problems
 - Recommendations to Improve Hardware and Software Planning
- Chapter Summary
- Selected References

INTRODUCTION TO PLANNING FOR HARDWARE AND SOFTWARE INTEGRATION

Building upon the planning aspects of information centers set forth in Chapter 2, this chapter looks at those areas of planning that are related to hardware and software integration. As a beginning point, there is a need to look at the most important factors to consider in selecting hardware and software for information centers. Typically, the emphasis in the past has been on price, functionality, and vendor reputation. Currently, the accent is on ease of integration with other hardware and software, compatibility, and data transfer. Thus, price is way down the list. The primary concern now is the integration of all the products supported since a typical organization must be able to interchange data. Typical questions that should be asked are: "How does this hardware and software product relate to the rest of the product line?" and "Can we move data around with the product easily?" Fully integrated hardware and software are capable of answering these questions in the affirmative.

In view of the foregoing comments concerning integration of hardware and software, this chapter looks initially at the utilization of microcomputers to improve productivity today and in the future. This is immediately followed by planning for microcomputers by the information centers. Complementary to these planning aspects is planning for micro software by the centers. This background is helpful in developing Part II of the IC questionnaire—Hardware and Software Integration. Finally, this part of the questionnaire is applied to the ABC Corporation in order to assist the information centers in planning better for hardware and software integration.

UTILIZATION OF MICROCOMPUTERS TO IMPROVE PRODUCTIVITY

From one viewpoint, the remarkable success of microcomputers has led some to believe that the ongoing wave of micros will radically change everything from the way in which major management information systems are built in organizations to the equipment and software distribution patterns of the information industry. Others, however, have more recently begun to question whether the recent popularity of micros amounts to much more than a fad, a kind of expensive "hula hoop" craze. Proponents of this second view claim that microcomputers really are not very useful, they remain idle most of the time, they will not significantly affect the way information systems are built in organizations, and they will fade into the background as soon as their relatively insignificant value, compared with their costs, is recognized.

Current Uses of Microcomputers

While a microcomputer may not be helpful to everyone, the vast majority of managers and operating personnel can perform their jobs better and more productively with the aid of a microcomputer. Those who claim otherwise do not have a good grasp of the real capabilities of a micro appropriately configured with adequate software. First, spreadsheet software, such as Microsoft, Inc.'s Multiplan or Lotus Development Corporation's 1-2-3, is relatively easy to learn and use. Anybody who needs to prepare a budget or a profit plan will find the task much easier with a microcomputer and spreadsheet software.

A second major use of micros is in word processing. Newer software offers word processing capabilities comparable in functionality to dedicated word processors. The number of microcomputers used for word processing now exceeds the number of dedicated word processing terminals installed. Users include many managers and operating personnel.

Third, newer fourth- and fifth-generation languages that are English based and easy to learn, as well as small business accounting, graphics, scientific and engineering applications, and a growing number of specialty applications, are readily available for microcomputers. These provide useful and productive tools, the mastery of which is well within the grasp of capable individuals who are not computer specialists.

Fourth, the ability of microcomputers, with the appropriate hardware and software interface, to emulate nearly any terminal device permits the user to gain telecommunications capabilities at modest incremental costs. This capability allows the end user to obtain data from the organization's database as needed.

Relationship of Microcomputers to Productivity

A major arguing point of the recent wave of debunkers of microcomputers is the indisputable fact that a typical micro in a corporate environment is used by its user only a small proportion of the time. From this fact, the conclusion is derived that organizations are wasting an enormous amount of resources through the use of microcomputers. The relevant issue is not whether the micro is used twenty-four hours a day, but what it does to improve productivity. The expense impact of a micro is small compared with the burdened expense of managers and operating personnel today. For example, if the microcomputer, used an hour a day, allows the user to accomplish what might have taken a whole day without it, then there can be little question of wasted resources.

In contrast, with large mainframe systems costing millions of dollars, the benefits of getting as much use out of them as possible are obvious. In a typical large installation, one attempts to keep the data center supplied with just enough capacity to do the job, and relatively high usage rates are desirable. The applicability of that type of resource management to microcomputers is by no means obvious. A manager will often not use his or her desk or telephone more than a portion of the time. That does not constitute a valid reason for not giving the individual a desk and a telephone or for having the individual share a desk or a telephone. The only relevant question is whether the micro helps its user to be sufficiently more productive, thereby justifying the cost. There is no question that, in most cases, the answer is clearly "yes." And not only does a micro provide a much quicker route to a result, but it gives the user a means of doing some things that the individual simply could not do manually.

Future Capabilities of Microcomputers

The current generation of software has already made the microcomputer a very useful tool. Yet it is only the beginning. The amount of talent and resources directed toward software development for micros has expanded enormously over the past few years. This effort is beginning to result in the growing availability of more and more powerful software, including general "tools" packages as well as vertical applications software.

The most widely used fourth-generation, database management, graphics, word processing, spreadsheet, and other packages of a year or two ago are already under siege by more capable competitors offering packages with more features, greater ease of use, and lower prices. The extremely competitive environment for software ensures a continued leap-frogging of capabilities with successive product introductions.

Some of the most important product introductions over the next few years are to be for new types of micro software products. Artificial intelligence and expert systems (to be explored further in the future) will

provide the foundation for developing micro software that will be more capable and easier to use than the present generation.

PLANNING OF MICROCOMPUTERS BY INFORMATION CENTERS FOR END USERS

A useful starting point in the planning of microcomputers by information centers is a policy regarding them. The policy should not only be enforced and backed by MIS and IC managers, but also should make sense and be helpful to end users. From this dual perspective, a microcomputer policy is one that describes what microcomputers will be used for and how they will be used. Therefore, a microcomputer policy for an organization should describe the appropriate use of and control over micros, the purchase criteria, the related software, and the end users' and software personnel's responsibilities. The policy then must include all elements of the microcomputer environment: the hardware, software, end users, data integrity, and maintenance.

Based upon the foregoing micro policy, microcomputers should be put to good use for information gathering and reporting. Although they can be used as terminals to the mainframe computers and as word processors and for graphics and so on, they should be closely analyzed. Micros are more expensive than dumb terminals, and if this is the sole use of the microcomputer, a cost/benefit analysis should be conducted to determine what equipment can produce the necessary results with the minimum investment.

Overall, the cost of integrating end-user microcomputers into a viable and workable information processing system with the aid of information centers must be addressed at the highest level of corporate planning. Controls must be implemented to guarantee the integrity of the information data flow. Without such controls, information deficiencies become a bottleneck to sound and informed management decisions. Additionally, a broad approach can be useful in resolving or, at least, reducing computer conflict problems; that is, start with a microcomputer policy that makes sense for the entire organization as well as for the individual functional business units. In this manner, the policy accommodates, rather than threatens, end users.

Micro Justification and Selection

Micro justification tends to engender a diversity of viewpoints. For example, a user might use his or her PC only an hour a week, but the application developed might justify that hour. On the other hand, another user might be on his or her machine for forty hours a week, but the application might be pure gloss with no substance behind it. From another

viewpoint, a cost-benefit analysis may be employed. As an example, a person requested a 3270 PC so that he could quickly connect between systems. He figured that he saved at least half an hour each day just in logging in and off time. He then computed the time he saved since he got the computer and multiplied that by his hourly wage. Based on that, the computer paid for itself in one year. When asked what he did with his extra time, he stated that he does a little bit more of what he is doing now. From another perspective, giving a microcomputer to a clerical person can be a waste of money. The clerical staff member may save time, but then he or she might just spend that time reading a book.

Additionally, micro justification can center on the intangible benefits, such as better information, increased productivity, better service to customers, improved communication, and more power in decision making. Ten to twenty years ago, computers addressed clerical tasks, such as a mass production of insurance policies and claim payments—the repetitive kind of work. The benefits could be quantified because the computers reduced head count. Because the microcomputers are geared toward the professional staff rather than the clerical, the benefits are not so tangible. Hence, in many cases, looking for “hard dollar savings” can be a waste of time. Since computers do not save time and money, they allow end users time to do more. For example, fifteen letters can be produced in minutes as opposed to the hours it took without the micro. In the long run, end users are able to produce more in a day than they normally would.

In light of the foregoing diversity of viewpoints regarding micro justification and selection, an intelligent approach is to try to utilize a cost/benefit analysis first to justify a micro by an end user. If that fails, the use of intangibles that can possibly be translated into tangible cost savings and benefits to the organization should be tried next. As a last resort, reference can be made to the intangibles that are not related to cost savings and benefits. As an example, if competition is using microcomputers in a certain function area, perhaps their own organization should be doing the same.

Based upon these generalized guidelines, there is need for a more specific micro policy regarding their justification and selection. Such a policy is found in Figure 3-1. Essentially, these guidelines deal with considerations that apply to any capital acquisition—making a sound investment in a resource and being able to account for it, share it, and maintain it properly. Once the micros are in place, a different kind of policy becomes paramount: helping the new micro users to succeed, and to succeed within the framework of the organization's information infrastructure.

Micro Procurement, Implementation, and Support

Once the micros have been justified and selected, the next major phases center on their procurement and implementation. Also, support should be

Figure 3-1

Typical Guidelines for Consideration in a Broad-Based Microcomputer Policy by Information Centers to Assist End Users

1. *Set forth specific purchase guidelines.* Centralize buying as much as possible since large transactions can save money and get better maintenance terms. A list of approved vendors is helpful because certain vendors will provide the greatest discounts and services if assured of a specific purchase volume. In any event, the information center staff should review purchase requisitions with an eye to hardware and software incompatibilities and inappropriate products.
2. *Develop investment payback standards.* The use of cost/benefit analysis and payback standards will assist end users in evaluating and justifying hardware and software investments. While there are those who argue that one can often get good results by bringing together a \$35,000 a year analyst with a \$5,000 investment, some micro acquisitions are not that clear cut. Payback is one way of deciding whether a micro investment is a good one. Other approaches include centering on converting the intangibles to tangibles or using the intangibles by themselves.
3. *Take an inventory of current microcomputers.* There are several reasons for looking at the installed hardware and software base. Sunken costs must be known and evaluated before any de facto standards are set. The installed base will obviously affect policy decisions and future acquisitions. An inventory will also help allocate resources properly.
4. *Develop appropriate standards for hardware and software.* Standards will facilitate the sharing of resources and the porting of development work. On the software side, the information center staff can evaluate packages and work together with end users to set standards in, for example, fourth-generation languages, word processing, database management, spreadsheets, communications, and other packages. These standards should also reflect any proposed strategic direction for data communications and future networking investments.
5. *Establish maintenance and security standards.* Poor machine and data maintenance can be expensive. These standards should describe proper hardware care and how to physically secure the computers. Handling of data and diskettes (backing up files, locking up diskettes) must also be covered. A potential loss of thousands of dollars in hardware and effort may be avoided by commonsense maintenance and security procedures.
6. *Develop appropriate legal guidelines.* Large sums of money may be at risk if legal issues are ignored. Novice users may be unaware of copyright restrictions on some software, and corporations have been sued for violation of these laws. Ownership of software that an employee develops after hours on a company machine may prove to be a tricky legal question. Clear guidelines for personal and business use can prevent such problems.
7. *Establish periodic policy reviews.* Microcomputer technology changes so fast that a solution defined today may not be cost effective tomorrow. Periodic reviews will facilitate wise investment decisions whether to buy, wait, or perhaps switch vendors. A new and improved graphics board, graphics software, tape backup, or local area networks might be a better solution than the one currently being considered.

included as the last phase. Essentially, micro procurement relates to the information center's doing the actual purchasing of micros for end users. However, in other organizations, the centers are used as means for assisting end users in acquiring their own hardware. The information centers act as a helpmate so that there is compatibility of hardware and software with that maintained by them. Important factors that should provide an underlying framework for micro procurement are an integral part of the broad-based microcomputer policy set forth in Figure 3-1. Reference can be made to these for a proper approach, in particular, purchase, legal, and periodic review guidelines.

Once the microcomputers have been procured and are being implemented, end users need all types of help. The information centers need to educate end users about the kind of help that is available. Some information centers hold formal discussions, organize general and application-specific training sessions, and publish informative IC newsletters. Application exchanges, arranged by functional area and coordinated by the information center staff, allow end users to see for themselves what their peers are doing. For example, a functional manager acknowledges and supports creative micro users—he calls them entrepreneurs—within his division. His goal is to foster direct communication with users and support a grass-roots acceptance of the technology.

In regard to training, the information centers provide a wide range, from support and training for end users to maintaining reference libraries of both custom and packaged software. For example, a large construction corporation has a micro-coordinator log of each application development project in the reference library. Micro users with new applications in mind are asked to look here first; they may find an appropriate package or custom-built system, or maybe even some reusable code. A system similar to what the user wants can serve as a prototype. At the very least, application templates (particularly spreadsheets) and customized packages can serve as foundations on which to build. In Chapter 6, an in-depth study of training will be given. Further discussion will be left until that time.

PLANNING OF MICRO SOFTWARE BY INFORMATION CENTERS FOR END USERS

In the preceding discussion on planning for new computer hardware, reference was made periodically to supporting software, in particular, in Figure 3-1. In this part of the chapter, we will build upon the prior material by taking a closer look at planning for micro software by information centers in order to assist end users. Essentially, micro software planning centers around fourth-generation and fifth-generation languages, spreadsheets, report generators, graphics, word processing, and database management systems. These areas are targeted for end users because they

result in important productivity gains, are easy to learn, and are user or programmer friendly. Currently, some of the micro software packages contain several of the foregoing components, thereby qualifying as a well-integrated software approach for assisting end users. Based upon these generalized comments, considerations for planning micro software are set forth, followed by comments about software vendor packages.

Software Considerations

Today, most information centers have an established process for software selection. As one information center manager stated: "It's planned by us with a lot of listening to the users. We try to anticipate their needs. If users ask for something that's not on our approved list, we try to convince them that they can do it with something within our portfolio. We may wind up allowing them to obtain the product anyway, in which case, if they run into trouble, they're on their own." In view of these comments, what software is offered by the information centers has been previously planned, as noted in Figure 3-1 (point 4).

Going beyond this general approach, there is a need to establish additional software criteria for selecting standard software products. The information center should look at the user application and try to find the product that will fulfill that need best. The information center can test many products before selecting the appropriate one. However, this process does not mean that a separate product should be purchased for each application. Obviously, selection should be made of flexible products that can serve more than one need. If users choose to go with a nonstandard product and elect to go "naked" on support, the information center should add this product to the supported list even if it serves only one application, as long as the user's choice of the product (over others already on the list) is warranted.

In addition, the information center should conduct a formal post-installation evaluation. The center can follow up on the product with an informal survey conducted during training or by telephone interviews with the users to determine if they are satisfied with the package and if it meets the needs of the application. In the vast majority of cases, the answers to both questions typically are "yes." Similarly, the information center should keep up with the new products and test many of them even before there is user demand. In this manner, the information center anticipates end-user needs before they arise.

Overall, most information centers generally fall into two categories when it comes to planning micro software currently. Either they support a package with heavy user involvement or they pick the de facto standard that has already arisen inside their user community or within the industry. As one person put it: "We evaluate software packages by interacting with

end users to see if a specific package will accomplish the tasks they're setting out to do." But, when it came to choosing a spreadsheet, an area with a strong standard, her company decided on Lotus 1-2-3 because it is an industry standard and end users are already familiar with it.

Related to the above software considerations for effective planning of micro software, typical guidelines are set forth in Figure 3-2. Essentially, these guidelines center on the information centers taking charge rather than end users, vendors, or attorneys. As with the points set forth in Figure 3-1 for a microcomputer policy, these are broad based to help end users rather than threaten them.

Software Vendor Packages

Although a number of guidelines can be set forth for selecting micro software (as noted in Figure 3-2), there is always the question: "Which software package should we buy?" The mass marketing of IC hardware and software has created the idea that software selection is an easy, one-time decision, rather like buying an automobile or a toaster. If software selection were so easy, however, there would not be so many frustrated end users of computer technology. Even "satisfied" users are often using inappropriate software—at a cost of needlessly low productivity and inefficiency in the use of computer resources. Generally, a large percentage of all end users is seriously frustrated by difficulty in the use of software.

The first difficulty of software selection is that the idea of a "best buy," although effective for *Consumer Reports*, simply does not apply to micro software. There is no such thing as the "best" software; there are only suitable and unsuitable packages for a given application. The second difficulty is that software can do harm if an incorrect decision is made. When the wrong software is purchased and installed, it can deplete hardware resources, thereby making information inaccessible or discouraging end users. The third difficulty with the best buy approach is that it is not suited to a world of uncertainty. As anyone who has ever tried to purchase even a low-cost software package can attest, the market is a minefield for the unwary. Announced software that does not exist and programs that do not function as expected as well as systems that do not integrate are a few of the traps that lie in wait for would-be software selectors.

Nothing can protect the organization against all of the above hazards, but software selection clearly requires a vision for the future and a strong IC strategic plan for guiding information center software decisions. Uncertainty can be managed more effectively with a plan and an understanding of the recent needs of end users that are shaping the information centers. Typically, the IC software portfolio should encompass a set of packages which provides strong coverage of the organization's business requirements. This means starting the selection process with a user needs

Figure 3-2

Typical Guidelines for Consideration in a Broad-Based Micro Software Approach by Information Centers to Assist End Users

1. *Select the right software package.* A starting point is to determine the organization's critical business needs. Because micro software products come in such a variety, some time should be spent on making up a short list of potential packages for solving critical business problems. Although this is an important stage, one should not become overly concerned with changing business environments and criteria because the majority of packages are highly adaptable. Thus, the information center should obtain the appropriate new software tools for assisting end users in meeting their critical business needs.
2. *Evaluate the product support area.* The information center should find out what troubleshooting services and education the vendor supplies. More importantly, it should find out what services are available from external organizations. Most vendors follow IBM's lead and supply a short list of approved service organizations. Most vendors have their own in-house consulting group, but the approved list keeps them honest and helps to ensure that their internal services are competitive both in quality and price. The information center should be suspicious of vendors that will not provide such a list; they obviously have something to hide.
3. *Make certain that adequate documentation is available.* Too often, new software tools suffer from the lack of proper documentation. This is particularly evident when a "bug" or a "supposed bug" has been found in the program. Without proper documentation, the information center staff is operating without direction.
4. *Be aware of the limitations of the software package.* This is difficult because if the IC has just bought the software package, the information center staff has been exposed to a marketing pitch. This is where user groups come in. The key is not to become overconfident in the software capabilities, but always reserve a healthy doubt. If it works, great; if it does not, have a good backup plan. An alternative approach is recruiting someone who does know the limitations.
5. *Be aware of the limitations of the information center staff to assist end users in utilizing new software packages.* Good up-front training for the IC staff is essential for success, but do not expect virtuosos after only a few days of education. It might be wise, if the budget allows, to use consultants in the early stages of product use, especially for design purposes to assist end users; however, be sure to take personal, financial, or other references on a would-be consultant and do not be fooled by the price.
6. *Conduct a post-installation evaluation of software packages.* The purpose of this evaluation is to determine whether end users are satisfied with the software packages; that is, do the current packages meet their needs? If there is a negative answer, there is a need to acquire appropriate software packages that truly meet end-user needs.

assessment. Hence, software selection is based first on end-user business needs, not on the technological attributes of the software packages.

INTEGRATION OF HARDWARE AND SOFTWARE PLANNING BY INFORMATION CENTERS

As seen in the prior discussion, hardware and software planning by information centers is not an easy task. Information center managers have the unenviable challenge of supporting end users with imperfect hardware and software during a period of rapidly increasing user expectations and rapidly improving technology. However, there is hope for the patient IC managers with vision. End users are becoming more informed, micro software is improving, and well-managed information centers are making an important contribution to business performance. Based on these trends, appropriate guidelines (refer to Figures 3.1 and 3.2) to assist IC managers in planning were set forth. Additionally, there are other guidelines to assist in the planning of hardware and software that need to be taken into consideration, which are set forth in Figure 3-3.

Figure 3-3

Other Guidelines for Consideration in a Broad-Based Approach to the Planning of Micro Hardware and Software by Information Centers to Assist End Users

1. *Recognize that automating using newer hardware and software is an ongoing dynamic process.* The steps toward a fully automated office will not end when the microcomputers are placed on end-user desks. Instead, there is need to address requirements and problems that, in turn, lead to others. The world of technology changes quickly.
2. *Select relatively simple, easy-to-use software and hardware products and progress to more complex products.* Most end users will have a learning curve to overcome. Select software and hardware, therefore, that are simple. As the users become increasingly proficient, purchase more sophisticated hardware and software.
3. *Use hardware and software initially to handle simple applications and progress to more difficult ones.* This will invariably present increasing challenges to end users on the job. It also gives users time to understand their systems and to learn how to apply them.
4. *If higher levels of management are ambivalent toward automation, end users will share this attitude.* Management must provide the necessary leadership to introduce microcomputer hardware and software successfully.
5. *Encourage full input from the end users who will use microcomputers.* These users can provide invaluable information about their requirements and capabilities concerning their business systems. It is easier to acquire their commitment for this effort.
6. *Focus on the overall requirements of the organization.* Automate with the expressed goal in mind of expansion. Do not make the mistake of automating solely to meet local end-user needs, but rather to tie microcomputing needs to the long-range requirements of the organization. This will make expansion considerably easier.

In light of the foregoing guidelines to assist in planning by IC managers, the accent is not only on the integration of hardware and software, but also on the need "to crawl before walking." More specifically, effective planning recognizes the need to take a gradual, evolutionary approach to automation in the work place. People need time to adapt to change, that is, to hear and think about new ways of viewing the work being performed on a daily basis as well as to change their work habits to accommodate the newer micro technology. Patience is needed on the part of information center managers and their IC professionals. Hence, hardware and software plans should reflect the human side of end users. Otherwise, the best laid information center plans will be for naught.

PART II OF THE IC QUESTIONNAIRE—HARDWARE AND SOFTWARE INTEGRATION

Part II of the IC questionnaire builds upon Part I presented in the prior chapter, that is, the planning of hardware and software to meet end user needs is brought down to a very practical level where questions are asked regarding the acquisition of appropriate hardware and software. Needless to say, micro hardware and software can be brought into an organization haphazardly or in a well-planned fashion. End users can buy them and bury their costs under other departmental costs, or they can be procured as part of a well-conceived program through the information centers. There are ample opportunities for micro computing in every organization, but are those opportunities identified and implemented in the most effective manner? This second part of the IC questionnaire takes a hard look at micro hardware and software from this broad-based perspective.

Major Sections of IC Questionnaire—Part II

The major sections of Part II of the IC questionnaire that are germane to the topical areas covered in the chapter include the following:

- Section A. Overall IC Hardware and Software Considerations
- Section B. Hardware Justification and Selection
- Section C. Hardware Procurement, Implementation, and Support
- Section D. Software Factors
- Section E. Software Vendor Packages.

These sections along with their detailed questions are set forth in Figure 3-4.

Within the various sections of the questionnaire, the planning aspects of acquiring software are examined. Underlying the acquisition process is the

Figure 3-4

Part II of the IC Questionnaire—Hardware and Software Integration

	Yes	No	N.A.
Section A. Overall IC Hardware and Software Considerations:			
1. Is acquisition of the hardware aspects of microcomputers aimed primarily at the end users rather than the other way around?	_____	_____	_____
2. Is the acquisition of the software aspects of microcomputers aimed primarily at the end users rather than the other way around?	_____	_____	_____
3. Are there specific hardware and software acquisition policies in force by the information center to reduce potential problems between IC professionals and end users?	_____	_____	_____
4. In the acquisition of hardware and software by the information center, is it handled in such a way that conflict between IC professionals and end users is minimized?	_____	_____	_____
5. Is there a periodic review of hardware and software by the information center to ensure that the organization is keeping up with the times?	_____	_____	_____
Section B. Hardware Justification and Selection:			
1. Is the end user responsible for justifying the acquisition of a microcomputer?	_____	_____	_____
2. Is the microcomputer to be purchased and implemented associated with meeting the needs of one or more specific applications?	_____	_____	_____
3. Does the end user have the proper financial expertise to justify the acquisition of a microcomputer?	_____	_____	_____
4. Does the end user have the proper background to make the selection of the appropriate hardware for a specific application?	_____	_____	_____
5. If the end user does not have the proper background for justifying and making the selection of the appropriate hardware, is the information center or a comparable organization resource a way out of this dilemma?	_____	_____	_____
Section C. Hardware Procurement, Implementation, and Support:			
1. Is there an approved company policy for procuring microcomputers?	_____	_____	_____
2. Does the approved company policy for procuring hardware focus on an information center or a comparable approach?	_____	_____	_____

Figure 3-4 (continued)

	Yes	No	N.A.
3. Are the microcomputers to be purchased capable of tying together with the company's present main-frame(s)?	_____	_____	_____
4. Are the microcomputers to be purchased capable of tying together with the company's future main-frame(s)?	_____	_____	_____
5. Are the microcomputers from the same equipment vendor procured to get economies of scale in support, training, maintenance, etc.?	_____	_____	_____
6. Is there an approved company policy for the implementation of the microcomputer that meets end-user needs?	_____	_____	_____
7. Does the end user receive the necessary training and support for the hardware and software acquired?	_____	_____	_____
8. Does the end user receive support beyond the initial efforts of the information center, vendor, and so on?	_____	_____	_____
9. Is there a periodic review by an independent third party to ensure that implementation of microcomputers is meeting end-user needs?	_____	_____	_____

Section D. Software Factors:

1. Because end users need assistance to use microcomputers properly, is there a proper level of support when deemed necessary?	_____	_____	_____
2. Are the present easy to use software packages made available to end users with the proper level of training and backup?	_____	_____	_____
3. Are the newer easy to use software packages made available to end users with the proper level of training and backup when they become available?	_____	_____	_____
4. Are easy to use programming languages, i.e., fourth- (e.g., IFPS and SAS) and fifth- (e.g., INTELLECT) generation languages, being used in place of the prior generation languages (e.g., BASIC and COBOL)?	_____	_____	_____
5. If the programming to be undertaken exceeds the capability of end users, is there provision to assist end users or, possibly, to turn the job over to the MIS department?	_____	_____	_____
6. Is there maintenance support for end-user computer programs? (As in mainframe applications, there is need to maintain end-user computer programs.)	_____	_____	_____

Figure 3-4 (continued)

	Yes	No	N.A.
7. If an end user leaves the company, is the programming investment made by that employee recovered?	_____	_____	_____
Section E. Software Vendor Packages:			
1. Is there a process for evaluating vendor software packages to determine which is best suited for the organization?	_____	_____	_____
2. Is there consideration given to acquiring vendor-supplied packages from a number of sources such that they are compatible with one another?	_____	_____	_____
3. Is there consideration given to acquiring software packages on the company's one or more mainframes that can be used by end-user microcomputers?	_____	_____	_____
4. Are vendor packages available in the information center for identifying microcomputer applications?	_____	_____	_____
5. Is there an information center policy that makes the use of microcomputers easy to understand and easy to implement?	_____	_____	_____

area of hardware compatibility. Needless to say, there are several advantages to buying microcomputers that are compatible: the ability to tie them together in the future; to get economies of scale in training, support, and procurement; and to make it easier for end users to change tasks by having a common micro with which to work. On the other hand, compatibility may mean buying a micro which is less than optimal for the task at hand. And compatibility may not be actually that important, because many microcomputers pay for themselves in one year or less. However, improving communications technology suggests being able to tie together incompatible PCs at some time in the future.

ABC CORPORATION—PLANNING FOR HARDWARE AND SOFTWARE INTEGRATION

As noted in the previous chapters, the ABC Corporation has five information centers, one located at central headquarters and four plants with attached warehouses. Within this structure, there are problems not only from the IC professionals' viewpoint but also from the end users', which cause computer conflict. Although the end users' problems differ from the IC professionals' problems, they are nevertheless real problems to end users.

From the end users' viewpoint, the relatively new information centers look ideal, but are, in fact, far from being so. Underlying their problems is the fact

that the information centers were the brainchild of the corporation's vice president and were mandated by corporate managers and their staff without consulting the end users (refer to Chapter 2). The lack of communication between the corporation's higher and lower levels of management has caused a great degree of friction. The end result is that front-line management does not feel a part of top management's plans, and they reject outright the efforts of the information centers or they fight with the centers' members when they use one. The end users feel that management went behind their backs. This resulting resentment will continue for many years, much to the detriment of the best efforts of IC professionals. Related to this problem are a number of hardware and software problems, which are enumerated above.

Hardware and Software Planning Problems

The *first* problem in the area of hardware and software planning results from the preference of end users for makes of microcomputers other than those recommended by the information centers. Because of this friction between the end users and the information centers, the end users tend to go their own way. They do not want the information centers looking over their shoulders. Not only is there a lack of control and of security over certain micro hardware and data, but there is also a resulting incompatibility of microcomputers with the corporation's mainframe.

There is a *second* problem in terms of software similar to one found in acquiring hardware. Such an incident was reported in the prior chapter where a senior manager from an end-user department saw a demonstration of Lotus 1-2-3. The vendor gave him a copy of the demonstration diskette, which he brought back to the office and distributed to other end-user departments. The information center found out about this when he and other departmental managers demanded that future spreadsheet training be done on 1-2-3 and not on the current product. In this situation, the end users are undermining the best efforts of the corporation's information centers.

A *third* problem causing conflict from the end users' viewpoint is the method of billing for services rendered by the information centers. Under this system, end users pay for training and the initial request for technical services. After startup, however, end users try to cut costs by doing all of the work on their own. Many attempt applications that are not suited for end-user computing or duplicate what others have already done. Moreover, the only time an information center member can guide end-user computing effectively occurs when a user feels free to talk to center personnel at any time and can trust their recommendations. In essence, the present method of billing the user has had a negative effect on assisting the individual.

Several other problems have surfaced that were not covered previously from an end-user viewpoint. *Fourth*, there is a problem in the area of

graphics. Graphics capabilities are available on the mainframe as well as on the micros. Both analysis and presentation graphics are supported. Output varies from simple screen displays to overhead transparencies generated by a pen plotter. Used either to produce a trend line on a screen or to make a final change to a transparency minutes before a presentation, graphics tools are quite popular. But graphics are easy to misuse. There are numerous instances where senior level end users spend a half hour or more in front of a CRT to get one graph just right or try to use a two-pen plotter to create several transparencies at one sitting. These situations have proved to be a waste of time and manpower. The fact that microcomputer graphics are not as user friendly as they should be has caused conflict from the end-users' viewpoint.

The information center standardizes course content instead of tailoring it for each class. This method ensures that all key points are covered; it also allows a second member of the team to take over the class at any time. However, on several occasions, this approach has led to a *fifth* problem. Both instructors have been called out of class because of end-user crises that they are best qualified to handle. Because no one else can fill in, training time has been wasted. End users have a field day with this type of situation, and all of the best efforts of the center's training are wasted under these unforeseen circumstances.

A *sixth* problem is related to the maintenance of microcomputers for end users. Each of the five information centers has chosen not to take out maintenance contracts on micro equipment but rather to keep two microcomputers for use as maintenance spares. These units are loaned to end users while their equipment is being repaired on a time and materials basis. Additionally, each center keeps several spare parts (a diskette drive and memory chips) and diagnostic programs on diskette. End users reimburse the center not only for maintenance costs, but also for rental on the temporary microcomputers. Basically, end users feel that they are paying more than they should. Because they have the use of only one microcomputer, why should they be paying for two? This is a very sensitive issue when the time period for repair is from two weeks to one month.

A *seventh* and a final problem from the end users' viewpoint is the turnover in the information centers. Needless to say, qualified candidates are scarce. After a period of time, from eighteen months to two years, IC professionals become bored with answering the same types of questions from a multitude of users. Also, there are always a few end users who are a cause of continual conflict. To a degree, information center members experience a form of job burnout. End users experience a certain level of anxiety when they have to deal with a new center member when, in contrast, the previous member was found to be accommodating to their needs. Also, the constant turnover tends to reduce the accessibility of the information centers to some end users.

A recap of the prior problems is found in Figure 3-5. For the most part, these problems are related directly or indirectly to hardware and software planning as they affect the corporation's five information centers.

Figure 3-5**Major Problems Related to Hardware and Software Planning for the ABC Corporation**

1. Because end users are allowed to acquire microcomputers other than those recommended by the information centers, some end users make their own decisions so that the information centers will not look over their shoulders. The end result can be the incompatibility of micros with the corporation's mainframes.
2. End users have gone their own way in terms of demanding certain software which has undermined the best efforts of the information centers.
3. The method of billing for services and training by the information centers is a problem in that the end users try to cut costs by doing all of their work on their own. The end result is that some end users attempt applications that are not suited for them or they duplicate what others have already done.
4. Graphics are misused by senior level end users who spend a half hour or more in front of a CRT terminal to get a graph just right or try to use a two-pen plotter to create several transparencies at one sitting. These situations could be solved very quickly by using the services of the information center.
5. Due to the size of the information centers, training sessions have begun where the original instructor and the backup instructor were called out of class because of end-user crises. As a result, a certain amount of time for end-user training is wasted.
6. End users who need to have their micros repaired find that billed costs for the micro spare from the information center are high, not to mention the costs to get their own micros back into operation.
7. Due to the turnover within the information centers, end users experience a certain level of anxiety dealing with a new center member when, in contrast, the previous member was found to be accommodating. Also, the turnover tends to reduce the accessibility of the information centers to some end users.

Evaluation of Hardware and Software Planning Problems

Although end-user computing uncovers many new approaches to meeting a myriad of business needs, it also creates many problems. As in Chapter 2, there is a need to assess these problems and others by utilizing Part II of the IC questionnaire (refer to Figure 3-4). In this manner, the real problems can be separated from their symptoms. Negative answers to this part of the questionnaire are found in Figure 3-6.

In Section A, Overall IC Hardware and Software Considerations, several questions were answered negatively, that is, questions 3, 4, and 5. Generally, the acquisition of the present hardware and software by the information centers is aimed primarily at the end users. However, the newer, more popular, easy to use software packages are not always available when end users need them. Reference is made to the introduction of Lotus 1-2-3 by end users rather than by the information center. In addition, question 5 has a negative answer since there is no formal committee such as an

Figure 3-6

Explanations for the "No" Answers in Part II of the IC Questionnaire—Hardware and Software Integration (see Figure 3-4)

Section A. Overall IC Hardware and Software Considerations:

- A.3. Although the official policy is for end users to acquire hardware and software through the information centers, for the most part, this policy is not followed.
- A.4. One of the major sources of conflict between the information center members and the end users has been over the method of acquisition of hardware and software by end users. A typical example is the manner in which Lotus 1-2-3 was acquired.
- A.5. Even though newer directions are being taken currently by the information centers, there is no guarantee in the future that these will be followed. Some type of an information center committee is necessary to ensure that the corporation is keeping up with the times.

Section B. Hardware Justification and Selection:

- B.3. Although the end users are responsible for justifying the acquisition of microcomputers (per the first question in this section), some of the end users do not have the financial expertise to justify their micro acquisitions. The problem is that hardware costs are just one element of the total cost of using a micro on a day-to-day basis.
- B.4. Most end users rely on word of mouth or current advertising to make their selection of hardware for a specific application. Too often, they ignore the services of the information centers due to problems encountered in the past with these centers.

Section C. Hardware Procurement, Implementation, and Support:

- C.3. Although the information centers are involved in the procurement of microcomputers, the end users have the final say about which micros are purchased. Due to problems with the information centers in the past, microcomputers not compatible with the corporation's mainframe are purchased to show the information centers "who is boss."
- C.4. The problems that exist currently for noncompatibility of microcomputers with the mainframe are expected to continue in the future.
- C.5. Since end users make the final decision in procuring microcomputers, the corporation is not realizing the lowest prices in terms of hardware, software, training, support, maintenance, and so on.
- C.9. Currently, there is no one person or committee charged with a periodic review to determine whether the implementation of microcomputers is meeting end-user needs. Also, this periodic review is not a part of the work undertaken by internal or external auditors.

Figure 3-6 (continued)

Section D. Software Factors:

- D.3. Although the present state-of-the-art software packages are available to end users, the same cannot be said about newer packages when they become available. As noted under the problem section, Lotus 1-2-3 was introduced in a vicarious manner, thereby putting the information center on the defensive.
- D.5. When programming tasks exceed the capability of the end user, there is provision to assist the user, but to the detriment of other users. In contrast, the provision to turn over the job to MIS professionals is available only through a formalized computer project approach.
- D.7. Generally, when an end user leaves the corporation, the time and cost invested in most programs are not recovered because the programs are tailored to meet the specific needs of the individual. What one individual feels necessary to accomplish his or her job is not necessarily true for others in the same position. Hence, the investment can be lost to the corporation.

Section E. Software Vendor Packages:

None of the questions were answered no.

information center committee charged with a periodic review of end-user support to ensure that the corporation is keeping up with the times. Also, the internal and external auditors feel that this is not their area of responsibility.

Under Section B, Hardware Justification and Selection, the negative response to question 3 indicates that, although the end users are responsible for justifying the acquisition of microcomputers (per question 1), some of the end users do not have the financial expertise to justify their purchases. The reason for this is that hardware costs are just one element of the total cost of using a micro on a day-to-day basis. In a similar manner, as noted in question 4, most end users do not have the proper background to make the selection of the appropriate hardware for a specific application. Most end users rely on word of mouth or current advertising to make their selection of hardware. Too often, end users ignore the services of the information centers because of problems encountered in the past with the centers.

While the preceding section has focused on the justification and selection of microcomputers, Section C, Hardware Procurement, Implementation, and Support, looks at actual purchase and related implementation and support problems. As indicated by the negative answer to question 3, the microcomputers that are purchased are not always capable of tying in with the corporation's present mainframe. Due to past problems with the information centers, micros incompatible with the corporation's mainframe are

procured to show the information centers "who is boss." In relation to question 4, the problems that exist currently for the noncompatibility of microcomputers with the mainframe are expected to continue. In reference to question 5, the corporation is not realizing the lowest price in terms of hardware, software, training, support, maintenance, and so on because the end users have the final say in procuring microcomputers. Question 9 is answered negatively: The corporation does have an approval policy for the implementation of microcomputers; end users do receive support for training from IC professionals; and end users do receive support beyond the initial efforts of the information centers, vendors, and so on. However, per this last question, there is no person or committee currently charged with a periodic review to ensure that the implementation of the microcomputers is meeting end-user needs. Also, this periodic review is not a part of the work undertaken by internal and external auditors.

Under Section D, Software Factors, there is the proper level of support of end users when deemed necessary along with the proper level of easy to use programming languages. However, as indicated by the negative response to question 3, the present state-of-the-art software packages are available to end users, but the same cannot be said about newer packages when they become available. Going a step further—question 5, which is also answered negatively—the provision to assist end users often occurs to the detriment of other end users. In other words, only a small number of end users can be helped at one time by each information center. Also, the provision to turn a complex job over to the MIS department is available only through a formalized computer project approach. Regarding question 7, when an end user leaves the corporation, the time and cost invested in most programs are not recovered because the programs are tailored to meet the specific needs of one individual. What an individual feels necessary to accomplish his or her job is not always true for others in the same position. Finally, Section E, Software Vendor Packages, range from the process of evaluation of vendor software packages to their capability of implementation; all questions are answered in the affirmative.

Recommendations to Improve Hardware and Software Planning

An examination of the many negative responses points out the fact that too many end users have gone their own separate ways to meet their own computing needs. This situation is quite evident in many of the aforementioned problems. Many times, the information centers are used initially to get the training and the information end users need and are largely neglected thereafter. The exception refers to end users who find that their capabilities are not sufficient to cope with simple to complex computing tasks. In such cases, they seek the help of the information centers.

From an overview, the functional business departments of the ABC Corporation are not working in complete synchronicity with the information

centers and the MIS department. The end users may be getting what they want out of the information centers, but more benefits could be reaped from them if both groups worked together. The present situation could be described as a "win-lose" situation, i.e., the end users win but the information centers lose, thereby resulting in the corporation's missing out on important computing benefits. If this situation continues to worsen, not only will the morale of the IC professionals be lowered, but staffing and turnover of the centers will deteriorate further. In essence, a bad situation becomes even more tenuous.

To overcome or reduce the hardware and software planning problems for the five information centers, several recommendations are set forth below: (1) corporate management should take the lead in setting an overall direction in the acquisition of computer hardware and software and (2) capital request procedures should be tied in with micro acquisition. Many other recommendations could be stated, including those related to computer conflict. These recommendations are stated in the form of guidelines for corporate management, IC professionals, and end users in Chapters 8, 9, and 10, respectively.

Corporate Management's Setting an Overall Direction in the Acquisition of Computer Hardware and Software. As in the preceding area of IC planning, ABC's corporate management must take the lead in hardware and software planning. Corporate management is responsible for taking the lead in addressing this important area. Similarly, it has under its overall jurisdiction the capability to overcome microcomputer incompatibility. Although there are several directions that the ABC Corporation can take regarding microcomputer hardware, corporate management has looked at the pros and cons.

For one, selecting a single vendor has both advantages and disadvantages. A single vendor would greatly simplify training, concentrate support skills, and offer purchasing leverage. The ability to tie microcomputers together in the future would be greatly simplified, and the problem of accessing the mainframe would have to be solved only once. On the other hand, a microcomputer that is good for one task may be unsuitable for others. As technology evolves, incompatibility problems that are difficult to solve today may become trivial. One vendor may not be able to address all the corporation's needs at a reasonable price.

As mentioned previously, the corporation's policy with regard to hardware standardization is similar to those made in many other corporations, i.e., a small number of products are approved as standards. Products are then chosen from the approved list to meet specific applications needs. The staff of the information centers reviews new products and recommends changes to the approved list when it is necessary to do so. In the event a job cannot be accomplished practically from the approved list, a mechanism has been established to allow deviations from the list.

In terms of computer software, the information centers—under the general guidance of corporate management—are responsible for buying or

leasing appropriate packages of micro software since these packages are relatively inexpensive, well documented, and easy to use. Although custom application development is faster here than it is in the corporate mainframe environment, the availability of packages makes traditional system development unnecessary for end users. The information center staff at the five locations keep the new software offerings up to date, encourage user input, and publicize their findings. Overall, micro software is tied in with micro hardware although the major concern of corporate management is related directly to the latter, but only indirectly to the former.

Tying in Capital Requirement Procedures with Micro Acquisition. Because the corporation lacks a definitive policy on microcomputer acquisition, there is a need for one that is tied into an approach that is accepted by end users, namely, the corporation's standard capital expenditure request procedure. Fundamentally, this consists of a one-page form listing costs, benefits, and alternatives and consequences of refusal, which is signed off by the end user. However, because the request procedure does not give end users a concrete list of benefit areas or encourage them to give a value judgment of what, say "faster response to queries" or "more effective communication" is worth, a supplement to the request form, based on studies of actual benefits from successful management information systems and the corporation's own experiences, should be appended. This list centers on benefits in the following categories: work eliminated, cost avoided, return on time, improved decision making, improved services, competitive edge, and quality of work life.

Building upon these "soft" versus "hard" benefits, which ask end users for either an estimate of each benefit's business value or the actual figure, the next part asks users what the system is worth—how much they would pay to buy it. Within a few days after preparation, an IC professional interviews the end user who is asked for a final opinion about the business value analysis. This is a serious evaluation which takes about an hour. The outcome should clearly indicate whether the micro is needed.

In terms of software, the end user should be provided with the appropriate level of software to meet his or her needs. Low-end and advanced software packages are provided so that the IC professional can supply incentives to the end user. He or she is saying in effect: "Look, if you want a quick, simple project analysis system, have your secretary spend an hour a week typing in figures and use X. Later on, you may want to use Y, which is much more powerful. You can do this with A, but it's likely you'll want to create some more complex reports. Try B."

As an example of utilizing advanced micro software for end users, the financial and accounting groups of the ABC Corporation purchased the FCS decision-support package from Evaluation and Planning Systems (EPS). Because EPS supports a microcomputer version (Micro FCS), this group will use it to collect (and later transmit) data. The current plan calls

for local sites to prepare forecasts using Lotus 1-2-3, then forward them to regional centers to be consolidated under Micro FCS. From there, the information will again be forwarded to central headquarters for further consolidation on the computer mainframe using FCS.

CHAPTER SUMMARY

As noted throughout the chapter, end users need help which can best be given by effective planning on the part of corporate management, assisted by the organization's information centers. End users know when they need computing assistance, but they may not know which applications are best suited to micro computing, and they cannot be counted on to make informed judgments about whether mainframe computing or micro computing is better for a specific task. If the path of least resistance is the microcomputer, they will be brought in to solve information problems they were not intended to address. This, then, is one area in which cooperative efforts between the information centers and end users can pay considerable dividends.

From this perspective, productivity increases were examined in the first part of the chapter. Using this as a background, planning for hardware and software were explored. The net result of examining these planning aspects was the development of Part II of the IC questionnaire, which was then applied to the ABC Corporation. Hence, the theory and practice of planning for hardware and software for end-user computing were set forth.

SELECTED REFERENCES

- Aberth, J., "Can You Justify Computers?," *Information Center*, March 1987
- Adrian, M., "Battle of the 4GL Titans," *Information Center*, April 1987
- Atre, S., "Storing Data about Data," *Information Center*, July 1986
- Ball, J., "Push Button DOS," *Information Center*, January 1987
- Behringer, M., "How to Be an Intelligent Buyer," *Information Center*, May 1986
- Bernknopf, J., "A 4GL by Any Other Name . . . Would Not Be COBOL," *Information Center*, October 1985
- , "4GL's without Philosophy," *Information Center*, June 1986
- Bright, D., "Microcomputers," *Computerworld*, October 20, 1986
- Brown, G. D., and D. H. Sefton, "The Micro vs. the Applications Logjam," *Data-mation*, January 1984
- Bryan, S., "PC Modeling Programs, New Micro Tools Outdistance Spreadsheets," *Computerworld*, September 15, 1986
- Bryant, S. F., "Corporate Micro Users Speak Out," *Computer Decisions*, July 2, 1985

- Carter, H., "Time to Open up the Data Dictionary?," *Information Center*, February 1987
- Di Cianni, N. M., "Room at the Top," *Infosystems*, November 1984
- Dodge, M., "Cloning a PC Standard," *Information Center*, January 1987
- Efroymsen, S., and D. B. Phillips, "Backstopping the IC Software Portfolio," *Information Center*, May 1987
- Fish, F., "What's So Special about Production Systems?," *Information Center*, June 1986
- Frank, W. L., "Micros and MIS Managers," *Software News*, March 1985
- Furge, S., and D. H. Mau, "Fourth-Generation Application Development," *Information Center*, June 1986
- Goldman, R., "Micros Help Shift Productivity Emphasis," *Computerworld*, May 28, 1984
- Grant, D., "Hammers, Monkeys, and the Fourth Generation," *Information Center*, July 1985
- Gremillion, L. L., and P. Pyburn, "Breaking the Systems Development Bottleneck," *Harvard Business Review*, April-May 1983
- Gruber, W. H., "Software Selection with Vision," *Information Center*, May 1985
- Hall-Sheehy, J., "Some Justification Is Better Than None," *Information Center*, May 1986
- Hannes, R., "Reconciling MIS, Micros, A Case for the 'Personal Info Center'," *Computerworld*, March 19, 1984
- Harris, L. R., "A Data Base Design Primer," *Information Center*, June 1986
- Hillhouse, J., "The Right Tool for the Right Job," *Computer Decisions*, March 15, 1984
- Hutton, T. J., "Personal Computers: Management Tools or Executive Tools?," *Infosystems*, June 1985
- Kelleher, J., "Managers and Graphics," *Information Center*, February 1985
- _____, "Prospecting for IC Iron," *Information Center*, July 1985
- _____, "Talking about the IC Portfolio," *Information Center*, May 1985
- Kemske, F., "On the De-Selection of Software," *Information Center*, May 1987
- Kilpatrick, M., "Computer Phobia," *Infosystems*, December 1984
- Kleinman, N., "Drawing the Graphics Line in Your Info Center," *Datamation*, June 1987
- Kliem, R. L., "Overcoming User Resistance to Microcomputers," *Administrative Management*, May 1986
- Knight, R., "Cell by Cell," *Information Center*, January 1986
- Kolodziej, S., "Working in Harmony," *Computerworld Focus*, February 19, 1986
- Lindholm, E., "IC Software Holdings," *Information Center*, May 1987
- _____, "The Mandate for Data Base Expertise," *Information Center*, February 1987
- Lyon, M., "When It's Time to Say Good-Bye," *Information Center*, October 1985

- Major, M. J., "Hot Software in the Information Center," *Business Software Review*, October 1987
- Mendelsohn, F. D., "Micro Management Victories," *Information Center*, November 1986
- Mimmo, P. R., "Between the Lines with Big Blue Product Offerings," *Information Center*, April 1987
- Moskowitz, R. A., "Non-IBM Micros: To Buy or Not to Buy?," *Computer Decisions*, August 27, 1985
- Mullins, C. J., "Software Evaluation by the Manual," *Information Center*, May 1986
- Mullins, C. J., and N. C. Mullins, "Thought Tools," *Information Center*, March 1987
- Parikh, G., "The Fourth-Generation Maintenance Gap," *Information Center*, September 1985
- Phillips, D. B., "To Code or Not to Code," *Information Center*, February 1985
- _____, "Tracking Software Evaluations," *Information Center*, May 1985
- Rakow, J., "Learning from the Learning Curve Skills, Knowledge, and Computer Literacy," *Data Training*, April 1983
- Ramsay, M. L., "The Search for the Perfect Data Base Tool," *Information Center*, February 1986
- Roman, D., "MIS/DP Trapped behind Backlogs," *Computer Decisions*, March 25, 1986
- Salm, G., "The Software Engineering Approach to Application Development," *Information Center*, April 1986
- Santarelli, M-B, "The Commerical Data Base: Is It an Information Center Essential or Extravagance?," *Information Center*, October 1985
- _____, "Is the IC Responsible for Illegal Software?," *Information Center*, April 1985
- _____, "Sorting the Mergers," *Information Center*, December 1985
- _____, "The Zen of Business Graphics," *Information Center*, November 1986
- _____, "When Is It Time to Get an IC Mainframe?," *Information Center*, February 1987
- Sigel, E., "The Selling of Software," *Datamation*, April 15, 1984
- Skinner, N., "The Productivity Paradox," *Harvard Business Review*, July-August 1986
- Snyders, J., "Past Tense, Future Perfect?," *Infosystems*, January 1987
- Stang, D. J., "A Look at PC Add-Ons," *Information Center*, January 1987
- Taylor, L., "39 Questions to Successful System Development," *Information Center*, February 1985
- Vacca, J. R., "Can the Prototype Do the Job?," *Information Center*, June 1986
- Verity, J. W., "Surveying the Mainframe Landscape," *Datamation*, May 15, 1984
- Vincent, D. J., "Is It Relational or Is It Relational-Like?," *Information Center*, October 1985

- Weinberg, G. M., and D. Geller, "Software As a One-Step Buttonhole," *Information Center*, May 1985
- Wiezbicki, B., "Microcomputers," *Computerworld*, October 20, 1986
- Wilson, R., "The 4GL Evaluation Team," *Information Center*, February 1986
- Young, T. R., "The Lonely Micro," *Datamation*, April 1, 1984

Part III

Organization for Effective Information Centers

4

ORGANIZATION OF INFORMATION CENTERS

ISSUES RAISED AND EXPLORED

- To examine the traditional organizational approach taken by the MIS department for designing systems as a basis for comparing to IC organization models.
- To explore the organization roles that IC professionals can take to assist end users.
- To set forth the current organization models that are used in the development of information centers.
- To set forth Part III of the IC questionnaire, which evaluates the effectiveness of the information center structure.
- To apply this third part of the questionnaire to the ABC Corporation to ascertain its IC organization problems.

OUTLINE

Introduction to the Organization of an Effective Information Center

Organization Structure to Assist End Users by MIS Department

Organization Model for MIS Development

Organization Roles to Assist End Users

Use of DDP Consultants to Assist End Users at Remote Sites

Use of Systems Analysts As DSS Change Agents

Use of DSS Coordinators to Assist End Users at Home Office and Remote Sites

- Information Center Professionals As Change Agents
- Organization Models of Information Centers
 - Difficulties with IC Organization Models
- Effective IC Organization Model to Overcome Difficulties
 - Overlooked Factors for an Effective IC Organization Model
- Part III of IC Questionnaire—Organization of Information Centers
 - Major Sections of IC Questionnaire—Part III
- ABC Corporation—Organization of Information Centers
 - IC Organization Structure Problems
 - Evaluation of IC Organization Structure Problems
 - Recommendations to Improve Organization of Information Centers
- Chapter Summary
- Notes
- Selected References

INTRODUCTION TO THE ORGANIZATION OF AN EFFECTIVE INFORMATION CENTER

Generally, organizational efforts to assist end users have been very far from ideal. In the past, the interaction between end users and developers of management information systems was often minimal. Great emphasis was placed on hardware and software requirements over end-user requirements. The net result was that the final system did not meet the end users' needs. The new MIS was forced upon users, thereby creating an enormous amount of resentment and hostility toward their developers, in particular, systems analysts and programmers. In light of these difficulties, an organization model was developed to try to resolve or, at least, minimize them. The organization model presented below is currently used in the development of management information systems.

More importantly, organization models of information centers along with an effective information center organization model are explored in some depth in the chapter. These major topics of the chapter are supplemented by the use of change agents within and outside the information centers. As in the previous chapters, the next part, i.e., Part III, of the questionnaire is developed and applied to the ABC Corporation.

ORGANIZATION STRUCTURE TO ASSIST END USERS BY MIS DEPARTMENT

As a starting point, an organization structure that is used by the MIS department to assist end users sets the stage for further development. That is, this widely used model provides a basis for new roles of IC professionals

not only during system development work, but also after the system is operating on a day-to-day basis. In turn, this background serves as a basis for using the information center as a change agent in how end users view their computing needs. This discussion is also a natural lead into the organization models of information centers that have been developed and are used successfully today.

Organizational Model for MIS Development

An approach to develop a newer MIS centers on the utilization of the following model, which consists of three groups: the MIS executive steering committee, the end-user review group, and the MIS project team. Each group has a specific role to fulfill, all of which are described below. For small to medium feasibility studies, which do not cross organization units, the MIS executive steering committee may be unnecessary, and the end-user review group may consist of only the MIS project manager and one or two others.

MIS Executive Steering Committee. Members of the MIS executive steering committee include top and middle level managers of any organizational groups that will use or be affected by the new MIS. The chair of the committee might be the highest level corporate manager who will achieve the major benefits of the system. For example, if a new inventory planning control system is to be examined, the vice president of physical distribution might be the chair; other members might be the vice president of manufacturing and sales and the controller.

End-User Review Group. Members of the end-user review group include middle and lower level managers of the organizational groups that will use or be affected by the new MIS and the MIS project manager. It is important to have the direct supervisors of the people who will use the system represented in this group. This will ensure that appropriate attention is given to details associated with activities the end-user group must perform or be involved in: database conversion, training, user manuals, parallel testing, and operational procedures. Frequently, it is the immediate manager of the end-user review group that is appointed chair. Again, it is important to keep the size of the group small. Often, membership will rotate—only those managers from the areas of the business currently being studied are included. As the systems analysis and design phases move from one area to another, an old member of the committee is dropped and a new member is selected from the new area under study.

MIS Project Team. The MIS project team members include the computer technical experts (i.e., systems analysts and programmers), people from the end-user organization who are familiar with the current information system, and people who will be affected by changes to the current system. The noncomputer people on the MIS project team should bring a background of in-depth experience, an interest in working on details, and a

desire to help improve the current system. The MIS project manager must be someone who can bring such a group of people together and help them to work together productively. Frequently, the MIS project manager is chosen from the computer technical staff because this individual has had previous experience in leading such groups. However, many successful MIS projects have been led by noncomputer personnel.

In addition, one or more outside consultants may be engaged to help in the early to late stages of MIS development. As the MIS project team and the end-user review group get into the details of the study, it may be helpful for the consultants to suggest modifications to the new MIS.

ORGANIZATIONAL ROLES TO ASSIST END USERS

Although the foregoing organization model is helpful in reducing hostility and resentment toward the MIS department, the newer approaches to assist end users require additional considerations not available directly through this model. More specifically, the far-flung operations within a distributed data processing (DDP) environment requires the use of DDP consultants not found in previous management information systems to assist end users. Similarly, the characteristics of decision support system (DSS) require a new orientation of systems analysts in that they must act as change agents in the development of such systems. Equally important is the need for DSS coordinators to assist end users at the home office and remote locations. Because of the importance of these newer directions to assist users, they are discussed below. Often, these organizational roles can be used by IC professionals. This is particularly true of large information centers. The tie-in with information centers will be treated later in this chapter as well as in the next chapter.

Use of DDP Consultants to Assist End Users at Remote Sites

Dispersion of information processing throughout a corporation requires effective organization of MIS professionals—particularly at the central site—and operations personnel—especially at the remote sites—to take full advantage of their individual talents. Although responsibility for DDP is often assigned to end users at all organizational levels, the central site is still accountable for all information processing operations. Therefore, MIS management at the central site must be involved in the development of end-user applications at every site. This involvement requires senior systems analysts to assume new duties as DDP consultants.

Duties of DDP Consultants. These duties include the following: (a) functional consulting, e.g., planning order processing and physical distribution and helping users to identify and design new areas of DDP applications; (b) technical consulting, e.g., designing interactive system capabilities and

database management systems and helping users to evaluate, design, develop, and implement new DDP applications; (c) establishing and demonstrating sound techniques, including project cost estimation, benefits analysis, and feasibility to identify and assess potential DDP applications; (d) providing assistance in and tools for project planning and control; and (e) organizing and participating in task forces that evaluate, design, and develop DDP systems with multiuser applications (i.e., common DDP systems).

As can be seen from the foregoing duties, the role of senior systems analyst changes from one of *doing* to one of *advising*. As DDP consultants, they plan operations throughout the organization and recommend appropriate controls over DDP systems. The use of these consultants ensures that what is planned will be controlled from a broad viewpoint; this approach results in optimal benefits for the entire organization.

In essence, DDP consultants operate as in-house consultants as distributed data processing systems are implemented. During the same time, many of the MIS functions formerly performed at the central site are transferred to the remote sites. Using the 80-20 rule, the bulk (80 percent) of data entry processing is handled at the point of data entry, and the remaining 20 percent is performed at the central site. Revamping the MIS department in this manner can result in more effective use of systems and operations staff members' talents.

Use of Systems Analysts As DSS Change Agents

In a decision support system project, the systems analysts must go beyond the traditional involvement in an MIS project. They must assume the role of change agents by planning and gaining acceptance for changes in the way in which the computers are used. However, there is a word of caution: Change can cause anxiety on the part of the end user. In fact, too much change can cause people to become negative toward the changes. Thomas H. Holmes, a psychiatrist at the University of Washington, has quantified personal change, ranking a list of commonly stressful events that may lead to illness. Almost 20 percent of these events are work related. Sample events (and point scores assigned them) are as follows: fired at work (47 points), retirement (45), business readjustment (39), change to a different line of work (36), change in responsibilities at work (29), trouble with the boss (23), and change in working hours or conditions (20).¹ According to Holmes, if a person's total points during a year approaches 200, the person may become ill. The successful change agent knows that people find change difficult, accept it at varying rates, and can become ill and ineffective if there is too much change.

Inasmuch as systems analysts usually bring about a certain amount of change during a DSS project, how should they act when they want to change people in an organization? By being sensitive to the organizational

setting, the systems analysts will have a better idea of the extent and force of change which will be acceptable and which will accomplish the DSS project goals. In addition, the systems analysts have a variety of change agent roles to select from. Specifically, they may assume the role of persuader, catalyst, confronter, or imposer.

Various Roles of DSS Change Agents. As a *persuader*, the systems analyst attempts to persuade employees to accept change as set forth by management. This is the mildest form of intervention for a systems analyst, merely helping people to change their attitudes and to adjust. Moving away from the least severe change, the systems analyst acts as a *catalyst*. The systems analyst introduces new ideas to the change process, but lets the user determine the operational changes. The amount of intervention is greater than it is in the persuader role, but still the systems analyst can act as a *confronter*. The systems analyst sets himself or herself in opposition to the user, because in the analyst's best judgment, the user will not achieve satisfactory change unless jolted into a completely different approach. Because this role frequently generates conflict, it should be used with extreme care. Finally, as an *imposer*, the systems analyst, with authority given by company management, imposes the plan for change on the user. Severe ill feelings and even job reassignments are common when this role is assumed. The nature of these various roles, which systems analysts can assume as a change agent, is illustrated in the following example.

The chief systems analyst for a large savings and loan association heard during a lunch conversation that her company was considering buying an automated portfolio selection system which would allow the manager to interact with the system instead of continuing with the current manual method. The systems analyst made further inquiries in the trust department and was asked, in turn, to help in the decision process. The new DSS was considered to be quite expensive. The analyst did a quick investigation of the success of the new system in two other firms that had installed it six months ago, and she compared these findings with the traditional manual portfolio selection success rates. There appeared to be no clear-cut advantages to the automated system, but several developments in selection simulation being made by one outside software vendor were promising better automated systems in the near future.

Because of her other commitments and because portfolio selection was new to her, the analyst did not exhaustively investigate the question. In meetings with the trust department, she chose a *catalyst* role, raising points which she felt were pertinent and providing structure to the conversations. In her catalyst role, she did not come to the discussions with her own decision already made. Instead, she came as a facilitator, to help others make a decision.

Another role the analyst could have assumed was that of *confronter*. She could have made a preliminary judgment about the new system, either for

or against. If the trust department judgment had polarized on the opposite choice and the analyst had stuck with her choice, a confrontation would have been impossible to avoid. It is unlikely that the best interests of the company would have been served by the confronter approach. The portfolio selection process is based on subtle factors, not at all evident at a casual look. It is certainly best to let those most familiar with portfolio selection make the choice.

In addition, the systems analyst could have become an *imposer* if she had sold her decision to the trust department decision makers and they had made the others in the trust department follow. But given the analyst's involvement in this project, this role would have been even less appropriate. The softer role of *persuader* would not have worked well either. The trust group was uncertain about what they wanted to do. They might have been persuaded to do something, but they really were the ones who should have made the decision, not the systems analyst, with her built-in limitations.

Use of DSS Coordinators to Assist End Users at Home Office and Remote Sites

Going beyond the use of systems analysts as change agents, there is need for DSS coordinators, who basically serve as liaison computer professionals with the end users.² There should be at least one coordinator who specializes in each of the organization's functional areas. Ideally, the individual should have an acquaintance with the organization based on some actual line experience as well as have confidence in the users. Also, the DSS coordinator should have training and knowledge of relevant disciplines, including computer technology; economics of computers and information; organizational, managerial, and decision-making theory; mathematical and statistical models; and behavioral sciences. With this background, the DSS coordinator should assist not only the systems analysts in work redesign efforts, but also end users in reaping the full benefits of decision support systems.

Role of DSS Coordinators. Within a typical decision support system, this coordinator is a full-time person who is found in the organization structure for each functional area. Because decision support systems are generally never finalized and evolve over time in response to changing conditions, there is a need for this person to coordinate the changes taking place. In essence, the DSS coordinator acts as a "continuous change agent" by alerting the users to newer and better ways to support decision making. In some cases, their activities are directed toward the users in terms of newer languages, software packages, quantitative models, and hardware improvements. Still in other cases, their efforts are directed toward assisting systems analysts in implementing system changes that are needed to meet changing times. Their assistance may take the form of assisting and supporting systems analysts as change agents. Overall, the DSS coordinators

are the link between the MIS department (i.e., systems analysts and programmers) and the functional departments (i.e., end users) within a decision support system environment.

Based upon the functions performed by the DSS coordinators and the structure of the organization, it is quite possible that they are IC professionals for all practical purposes. The main reason for stating this view is that a greater number of end users can be served by DSS coordinators. Also, all of the DSS hardware and software tools needed are typically found in the information centers. Hence, it behooves many organizations to assign DSS coordinators to the information centers either at the home office or at remote sites.

INFORMATION CENTER PROFESSIONALS AS CHANGE AGENTS

As indicated above, systems analysts within a DSS operating mode can act as change agents. They can assume an appropriate role to assist end users in obtaining a successful decision support system. In a somewhat similar manner, information centers can act as change agents. More to the point, IC professionals need to have a "teaching attitude," that is, they have not only studied the various roles that they can assume as IC professionals, but they can also effectively use all of their interpersonal skills, such as listening, empathizing, and asking effective questions. They should have an affinity for technology without making the technology an end in itself. While one of their major jobs seems to be constant reading and updating of information and resources on the latest technological advances, their real aim is to help people make use of what is currently available in the information centers. At times, this requires using one or more roles of change agents.

From this broad perspective, the line between end users and IC professionals is getting narrower. Essentially, when information center professionals act as change agents, they tear down the walls between them, allowing the organization to adjust to newer developments in rapidly changing times. If there is a common theme to the experience of IC professionals and end users operating in a change agent mode, it is flexibility—flexibility in the IC staff and flexibility among the end users who trust IC professionals. End users who have moved fast and have been willing to drop what was not working in order to go on to the next order of business have been the key to the success of an unusual—an enviable—information center. Thus, if IC professionals do an exceptional job of assisting end users in making the right moves at the right times by using a change agent role, the end result can be improved productivity and profitability for the organization.

ORGANIZATION MODELS OF INFORMATION CENTERS

Before developing organization models for various sized information centers, it would be useful to look briefly at their past developments. The classic computing problem of the 1970s and the early 1980s was the growing number of end users requesting corporate data from an overburdened MIS department. The end user needed to make a request in triplicate in order to change a report format. Thus, a basic function of information centers, past and present, is to take some of the burden of end-user querying off the backs of the MIS department. Similarly, information center computers process end-user queries so that the corporate mainframe is left free to carry out day-to-day operations.

Typically, the early information centers of the 1980s were rooms full of terminals, staffed by IC programmers trained to help nontechnical end users translate their data needs into computer language—and, conversely, to explain to users computing facts of life, such as why a request for a 10,000 record sort will have to be done overnight when the computer is less busy. The IC programmers might generate some queries themselves and channel others to the proper MIS departmental unit. Encouraging end users to do their own querying was the one option most information centers ignored—to their own detriment.

The microcomputer explosion and subsequent growth of distributed data processing started the decline of terminal rooms and centralized end-user computing. The new computing environment gave information center staff members a whole new set of responsibilities, such as enforcing corporate guidelines for end-user computer equipment purchases, and discouraging users from creating their own personal—and often inconsistent—versions of corporate databases. For a short time, MIS managers comforted themselves with hopes that decentralized PCs and package micro software would at least lighten their burden. Instead, end users increased in significant numbers and computer literacy increased throughout the organization. End users requested such items as, "How do I send this document from a micro here in New York to a Wang in California and interact with the recipient in the meantime?"

Instead of making life easier for MIS programmers, micros added to their workload. In the early phase of a company's micro implementation, end users were content with rekeying data from hard-copy processing reports. Soon, however, they begin making ad hoc requests for data not in the reports, requiring the MIS department to generate new reports.

The next phase in information center development is currently under way. End users demand that their micros be linked directly to the corporate mainframe. Hence, the MIS department is still coping with too many requests for data—only now they come from micro end users. Generally, companies are allocating a large percent of end-user support

resources just to keep MIS's head above water—supplying end users with the data they need and supporting applications with short payback periods.

In light of the above discussion on IC developments, many organizational models of information centers have been designed. Typical models for small, medium, and large organizations are found in Figures 4-1 through 4-3, respectively. For a typical small organization, there is one centralized information center which is under the direction of an IC manager. As shown in Figure 4-1, this manager is assisted by a systems analyst, a programmer, and a secretary (for administrative purposes). Training is normally under the control of the IC manager.

In a medium sized information center, shown in Figure 4-2, the IC manager is assisted by two systems analysts, two programmers, one hardware specialist, one software specialist, and one secretary (for administrative purposes). Generally, training is undertaken by the two specialists, backed up by the IC manager. If the organization is operated in a distributed data processing mode, there may also be a DDP consultant who acts as a liaison between the home office and the remote sites. The size of the information centers at the remote sites and the number of personnel would be similar to those found in Figure 4-1.

The large information center, which is a full-service center, has the potential to be of the greatest assistance to end users. Generally, the size of the IC staff starts at twelve. There is no upper limit on its size other than its ability to be cost effective. Its size depends on the number of end users served. The large information center offers all of the services provided by the medium sized information center; however, it is characterized by its separate training support group and its consulting support group. A typical large information center is found in Figure 4-3.

Figure 4-1
Information Center for a Small Organization

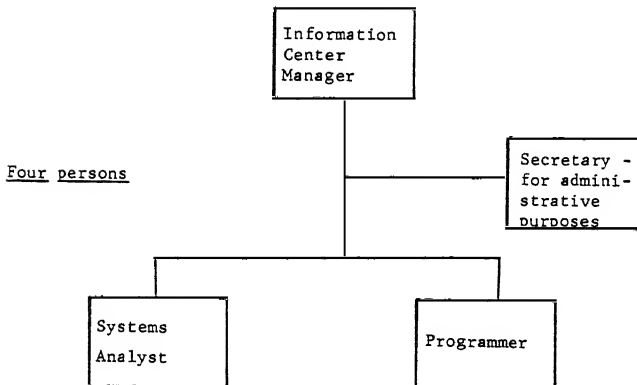


Figure 4-2
Information Center for a Medium Organization

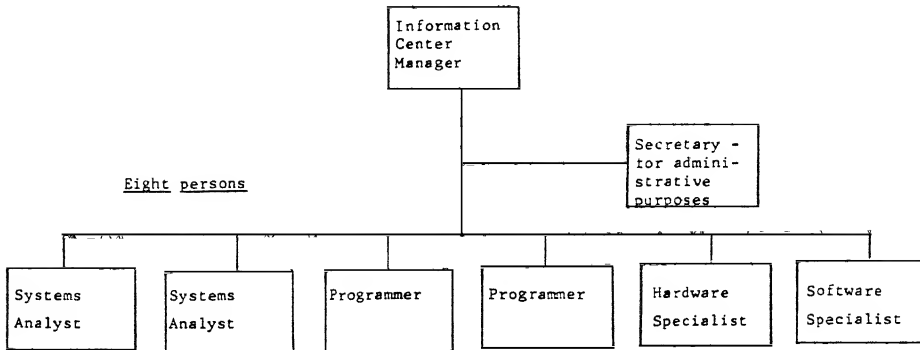
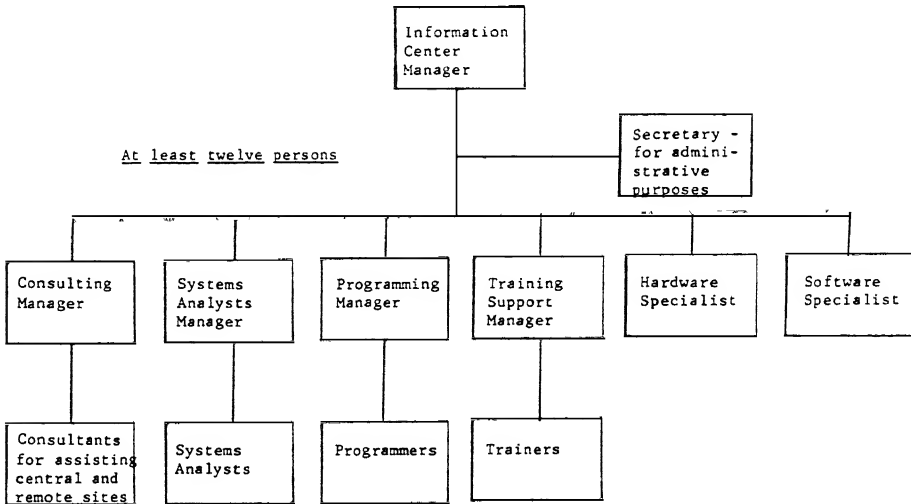


Figure 4-3
Information Center for a Large Organization



At the highest level, the information center manager is assisted by a number of managers, namely, consulting, systems analyst, programmer, and training. As illustrated in Figure 4-3, each manager is assisted by several IC professionals, the number of whom depends on the needs of the end users. Also, the IC manager is assisted by a hardware specialist, a software specialist, and a secretary who performs a number of administrative tasks for the IC manager. Although not shown, an important function of the information center is the introduction of new technologies into the organization.

Difficulties with IC Organization Models

Although not shown in Figures 4-1 through 4-3, a number of difficulties underlie IC organization models. In Chapter 2, reference was made to a number of difficulties that cause conflict between IC professionals and end users. Underlying these difficulties is the whole attitude and direction taken by the information center staff. This issue has to do with whether the organization wishes to encourage acquisition and use of microcomputers or prefers to react to demand for them as it arises. Under the *reactive* approach, those responsible for the information center can plan its services around identifiable end-user demand.

If end users have begun requisitioning IBM PCs in large numbers, for instance, then training and assistance for this product should be available in the center. If the engineering department has a strong interest in graphics, or the accounting department has made a commitment to acquire a certain spreadsheet package, these preferences would provide leads to what the information center should emphasize. The reactive approach is often coupled with a micro acquisition policy that is intended to discourage rampant use of microcomputers for whatever reason, for example, spare capacity available on the mainframe or lack of budgetary resources for equipment purchase.

In contrast, a better approach to overcome many difficulties found in current IC organization models is the utilization of the *proactive* operating mode, that is, the information center is committed to providing new technology. In fact, the information center aggressively seeks to introduce new technology that offers the potential for increased productivity and enhanced end-user performance. The center precedes user demand. It may offer training on the UNIX operating system—even though most users are content with CP/M—in anticipation of the need for handling multiple jobs on a 32-bit supermicro. Windowing may be highlighted as an attractive feature for executive workstations, or a “mouse” may be provided for the micro, along with the requisite software, to demonstrate interaction without keyboarding.

There is, however, a word of caution. A decision on this issue involves a good deal of human judgment as to the best way to deal with technology transfer. A proactive stance, while very exciting, may encourage unneeded expenditures by end users and run counter to efforts to achieve standardization and interoperability among equipment. The reactive approach, on the other hand, reduces the information center leadership role in technology transfer because the staff must wait for strong user demand before responding. This demand may be engendered through vendor marketing, articles in the popular and business press, and other outside pressures that do not necessarily contribute to the organization's best long-range information processing interests.

EFFECTIVE IC ORGANIZATION MODEL TO OVERCOME DIFFICULTIES

Because the information center is intrinsically different from other information services that have been offered in the past, most well-managed MIS departments have, in recent years, gone to some pains to train systems analysts and programmers to become more adept at working with end users in defining their requirements. Thus, a starting point for an effective IC organization model is the proper level of training IC professionals. Typically, the IC staff is quite small compared with the professional staff found in the MIS department. Usually, the information center is operated by a staff of from four to twelve employees. The number of employees depends upon the level of demand for service, the types of services provided, and the extent to which outside part-time consultants are used for training and technical support. Overall, due to the IC's small size, the training requirements of IC professionals usually do not overwhelm the MIS department.

Regardless of size, the IC professionals should either individually or in combination have a number of other capabilities that transcend their training. More specifically, IC professionals should possess interpersonal skills along with a good knowledge of hardware and software technology and applications. Most important is a sensitivity to the special needs of end users throughout the organization. The most successful information centers have a manager who has good communication skills and the ability to interact with corporate management and build networks of supporters and users.

Overlooked Factors for an Effective IC Organization Model

Although all of the foregoing attributes of IC professionals are present and are found in any size IC organization model, there is still a need for considering other factors that are germane to the development of an effective IC model. One item that is often neglected is the integration of micros with the *formal* and *informal* structures of the organization. This is a complicated task because it requires being knowledgeable about computing technology and behavior at the same time. But it is necessary since microcomputers affect the social and organizational environment. Microcomputers will inevitably affect social, communications, and organizational relationships, especially when the systems are networked. Hence, the accent should be on tying together the formal and informal structures that assist end users in getting their computing tasks accomplished.

Another overlooked factor is automating too much, too rapidly. IC managers become imbued with "technological fever" and want microcomputers in every office immediately. Impatiently, they order several

machines and a plethora of software without giving employees a chance to become adjusted to their use. Needless to say, people manifest their resistance in many ways. A sudden reduction in productivity, a sharp rise in absenteeism and turnover, and withholding vital data are just a few of the ways in which people display their hostility toward this technological fever. The message, then, should be clear: "Proceed in steps. Do not take on too much too fast."

Related to the above factor is avoiding emotional involvement in the entire automation process. Automating any part of the office by end users is a complex, time-consuming, and frustrating experience. It is easy for IC professionals to fall into the trap of getting embroiled in arguments with end users over petty details. An effective IC organization model should not contribute to the emotional turmoil that may already exist among end users.

In light of the prior factors, an effective IC organization model should anticipate any major behavioral problems and establish contingency plans to handle them. Automation using microcomputers involves changing the status quo, which can upset end users and create a host of behavioral problems. It is helpful to anticipate how people will react in general and in specific cases. With that information, the emotional reactions that typically arise when an office starts using microcomputers can be handled.

Another important factor is to establish communications channels to obtain feedback on the progress of automation by end users. Some good ways to acquire feedback include sending questionnaires to end users, maintaining an open door policy, and using forms to record information on machine utilization. Favorable feedback is very effective in boosting the morale of end users as well as IC professionals.

Last, but not least, is the overlooked factor of flexibility of the IC organization model. As end-user needs change and grow, the hardware and software must change as well. Information centers with flexible environments are at a tremendous advantage to meet better end-user needs today and in the future.

In summary, the key point to remember when end users automate with microcomputers using an information center is that the entire effort is an ongoing dynamic activity. It impacts the formal and informal structure of the organization, and, therefore, requires patience on the part of IC professionals. Everything will not go smoothly. Occasionally, users' morale will drop and so will productivity. But an effective IC organization model should have built-in ways to alleviate or avoid such problems.

PART III OF IC QUESTIONNAIRE—ORGANIZATION OF INFORMATION CENTERS

In the first two parts of the IC questionnaire, the focus was on the evaluation of planning activities by the information centers. For Part III,

the emphasis is on determining whether the organization is appropriate for activities performed by IC professionals when interacting with end users. It may well be that end users want to look at data across every major system of the organization, ranging from order entry to payroll to manufacturing. From this very broad perspective, bringing it all together is a difficult task for IC professionals—one that requires an effective organization structure.

Typically, after the IC professionals define end-user needs, the MIS department has to “populate” the database and get the data in the right format, in the right place, and at the right time. A well-organized information center is one of the catalysts that brings the data management function to the forefront in the organization. Thus, different end users have different needs, and the information centers have to offer a correspondingly diverse set of tools. Failure to do so is indicative of the weaknesses of the information center’s structure to meet end-user needs.

Major Sections of IC Questionnaire—Part III

The major sections of Part III of the IC questionnaire explored in this chapter—Organization of Information Centers—include the following:

Section A. Overall IC Organizational Considerations

Section B. IC Organization Structure

Section C. Organization of IC Professionals to Assist End Users

Section D. Organization of Information Center Committee

Section E. Organization of End-User Groups.

The foregoing sections, shown in Figure 4.4, center not only on evaluating the entire IC organization structure, but also on the organization of end-user groups. The major thrust behind the questions in Figure 4-4 is to evaluate whether the organization is reaping the benefits of its information centers based upon the present structure.

ABC CORPORATION—ORGANIZATION OF INFORMATION CENTERS

In terms of the structures set forth for the ABC Corporation’s information centers, they are the same throughout the corporation. That is, each information center, whether it be at central headquarters or at a plant with an attached warehouse, consists of four people—the IC manager, a systems analyst, a programmer, and a secretary (see Figure 4-1). It is anticipated that as the corporation grows and as end-user demands increase, the information centers will show an increase in the number of full-time staff. The problems discussed below are based upon the present IC organization structure.

Figure 4-4

Part III of the IC Questionnaire—Organization of Information Centers

	Yes	No	N.A.
Section A. Overall IC Organizational Considerations:			
1. Is the information center(s) under the direction of a capable manager(s), i.e., do they practice managerial functions versus accenting only the technical aspects of their job?	_____	_____	_____
2. Is the information center leading in setting up appropriate organization structures that assist end users in meeting the computing demands placed upon them?	_____	_____	_____
3. Is the information center taking the necessary steps to set up the organization structure for integrating the organization's mainframe(s) with the widely scattered microcomputers?	_____	_____	_____
4. Does the information center's organization structure fit logically within the MIS department structure?	_____	_____	_____
Section B. IC Organization Structure:			
1. Is the information center's organization structure designed to meet end-users needs first and not the needs of IC professionals first?	_____	_____	_____
2. Is the information center's organization structure considered appropriate by end users, that is, do end users feel there is a "good fit" among themselves, their jobs, and the services offered by the information center?	_____	_____	_____
3. Is the information center structured along the lines of one of the well-established models that are effective in assisting end users?	_____	_____	_____
4. Is the information center's organization structure capable of being modified easily to handle increasing volumes without the problems of deteriorating service?	_____	_____	_____
5. Is the information center's organization structure designed to minimize computer conflict between IC professionals and end users?	_____	_____	_____
6. Is the information center's organization structure reviewed periodically to ensure it is relevant to the times?	_____	_____	_____
Section C. Organization of IC Professionals to Assist End Users:			
1. Do IC professionals assume the proper role (i.e., change agent, consultant, or coordinator) where deemed appropriate to assist end users?	_____	_____	_____

Figure 4-4 (continued)

	<u>Yes</u>	<u>No</u>	<u>N.A.</u>
2. Are IC professionals properly trained to assume the role based upon the direction that end users want to take?	_____	_____	_____
3. Are IC professionals positive in their dealings with end users by being truly helpful versus just trying to help?	_____	_____	_____
4. Do IC professionals cause needless conflict with end users because of end users' biases in terms of services offered by the information center?	_____	_____	_____
Section D. Organization of Information Center Committee:			
1. Is there an information center committee to give direction to the information center?	_____	_____	_____
2. Is the information center committee composed of qualified IC professionals and end users?	_____	_____	_____
3. Is the information center committee useful in assisting end users by meeting their real versus their assumed needs?	_____	_____	_____
4. Does the information center committee meet often enough to answer pressing end-user needs whether they be real or assumed needs?	_____	_____	_____
5. Is there a periodic review to ensure that the information center committee is operating as originally intended?	_____	_____	_____
Section E. Organization of End-User Groups:			
1. Does the management of the information center recognize the need and importance of end-user groups?	_____	_____	_____
2. Does the management of the information center support wholeheartedly the activities of end-user groups?	_____	_____	_____
3. Have end-user groups been made an integral part of the functions of the information center?	_____	_____	_____
4. Have end-user groups actively solicited the active participation of all end users?	_____	_____	_____
5. Have end-user groups become affiliated with outside end-user groups so that their continuity is assured?	_____	_____	_____

Many of the organization problems found in the ABC Corporation are found in most other organizations. Because information centers offer an array of services with great emphasis on training and familiarity with a variety of

hardware and software, a number of problems can arise in the process of accomplishing such tasks. Before the services can be planned and organized, several problem areas must be evaluated. Resolution of these areas will define the services to be offered and help set the direction for the entire information center effort for the ABC Corporation. The evaluation of IC organization structure problems is given below.

IC Organization Structure Problems

In chapter 3, a long list of problems concerning hardware and software planning (refer to Figure 3-5) was enumerated for the corporation's information centers. The salient points of several of these problems, from an organizational standpoint, are summarized below. Because information centers were mandated by corporate managers and their staff without the help of end users, users feel that they were not consulted on important matters that concerned their well-being. This important organizational problem is now the cause of a whole host of other related problems: (1) end users acquire micros other than those recommended by the information centers, (2) end users acquire whatever software they want, (3) end users attempt applications that are not suited for micros or duplicate what other end users have already done, and (4) end users misuse graphics for specific applications.

Going beyond these problems, which focus on the organizational aspects of information centers, references can be made to overlooked factors for an effective IC organization model set forth in the chapter. More specifically, there is lack of knowledge by the IC professionals regarding the relationship between the formal and informal structures of the end-users' work place, the desire of IC professionals to move too fast caused by technological fever, the emotional involvement in automation that may contribute to the turmoil already present, the lack of anticipating end-user behavioral problems and contingency plans to handle them, the total lack of establishing communication channels to obtain feedback on the progress of automating the end-users' work environment, and the overlooked factors regarding the flexibility of the IC organization structure to change and grow over time. Overall, these factors center on the lack of progression on the part of the information centers to meet end-user needs today and tomorrow.

Evaluation of IC Organization Structure Problems

To more fully understand the foregoing organization structure problems as well as others linked to the ABC Corporation's information centers, Part III of the IC questionnaire (refer to Figure 4-4) will be used to separate the real IC organizational problems from the assumed ones. Also, this part is

helpful in assessing where the ABC Corporation is today versus where it should be in the future to meet end-user needs. All "no" answers to this part of the questionnaire are found in Figure 4-5.

In Section A, Overall IC Organizational Considerations, questions 1 and 2 have been answered negatively. Essentially, the information centers are under the direction of IC managers who stress the technical aspects but ignore their managerial functions, especially the human aspects of working with and through end users effectively. Because the information centers were established without the cooperation of end users, many times, end users make their own decisions about micro hardware and software, using the information centers only as a last resort. Essentially, end users feel that the information centers do not lead in setting up organization structures that really assist them in meeting their computing needs. Related to these "no" answers are the negative ones found in Section B, IC Organization Structure. Not only do end users feel that they have been considered last by the information centers but also that the services offered do not help them directly in terms of their day-to-day operations. The net result of these negative perspectives, per question 5, is that there is a considerable amount of computer conflict occurring between the IC professionals and themselves.

Under Section C, Organization of IC Professionals to Assist End Users, all four questions have been answered negatively. End users feel that IC professionals lack the ability to communicate on a truly friendly level with end users. The emphasis seems to be on the technical aspects to the detriment of developing user-friendly approaches. End users perceive that the distancing problem between IC professionals and themselves is caused by the lack of interpersonal skills. Because IC professionals do not take a balanced approach between technical and human skills, they are perceived as "trying to help" rather than "really helping" in solving end-user computing problems. Over time, this mode of operation has resulted in conflict, which continues to the present day. To overcome or, at least, reduce these long-standing conflict problems, an information center committee should be set in motion to address them. As shown in Section D, Organization of Information Center Committee, such a committee, per question 1, is not currently in effect.

Finally, per Section E, Organization of End-User Groups, the managers of the information centers for the ABC Corporation do see the need for end-user groups but have not yet organized end-user groups (refer to question 2). In addition, they do not support their interaction with external groups. The results of this attitude is that end users interact among themselves and have, in effect, *de facto* user groups.

A thorough understanding of all the negative responses to Part III of the IC questionnaire indicates some glaring deficiencies in the corporation's information centers. Although the formal IC structure is deemed sufficient to meet end-user needs from a technical standpoint, the way in which the end

Figure 4-5

Explanations for the "No" Answers in Part III of the IC Questionnaire—Organization of Information Centers (see Figure 4-4)

Section A. Overall IC Organization Considerations:

- A.1. Information center managers who assisted in their establishment do not understand the nature of ICs; the information centers were established behind the backs of the end users. The IC managers tend to emphasize the technical aspects of their jobs and not the managerial aspects.
- A.2. The information centers were set up under IC management's direction, and the end users feel that they were not consulted. Hence, end users make their own decisions about how to meet their computing needs.

Section B. IC Organization Structure:

- B.1. By and large, the information centers were not designed originally to meet end-user needs; however, the emphasis is changing toward meeting their needs first.
- B.2. Presently, there is a "poor fit" among the end users, their jobs, and the services offered by the information centers. Attempts are being made by the IC staff to remedy this situation.
- B.5. Essentially, the way in which the information centers were initially set up tended to maximize rather than minimize computer conflict between IC professionals and end users.

Section C. Organization of IC Professionals to Assist End Users:

- C.1. If the IC professionals had assumed the proper role (i.e., change agent, consultant, or coordinator) in assisting the end users, the conflict currently going on would be at a minimum level.
- C.2. Although the IC professionals are technically trained, they lack the interpersonal skills of working with and through end users effectively.
- C.3. Because the IC professionals do not take a balanced approach (technical and human) in their dealings with end users, they are perceived as just trying to help end users.
- C.4. End users are perceived as having biases in terms of the services offered by the information centers. This is particularly pronounced in terms of acquiring micro hardware and software.

Section D. Organization of Information Center Committee:

- D.1. At this time, there is no information center committee to assist in the planning and development of information centers over time; therefore, the other questions have been answered "N.A." (not applicable).

Section E. Organization of End-User Groups:

- E.2. Although the IC managers see the need for end-user groups, per question 1, they have not yet organized end-user groups. Instead, end users have formed their own groups. Thus, all other questions have been checked "N.A." (not applicable).

users perceive its past and current operations is totally different from that of IC management. Appropriate recommendations are in order to overcome the problems that center on reducing the conflict between IC professionals and end users.

Recommendations to Improve Organization of Information Centers

Due to the number of negative answers in Part III of the IC questionnaire, two important recommendations to improve the corporation's five information centers are in order. *First*, the focus is on integrating organizationally the interests of the information centers and the end users under the direction of corporate management. *Second*, a different direction is provided to assist end users that will meet their changing needs over time. These recommendations will help alleviate the current situation where end users tend to go their own way to meet their computing needs. The result should be a better fit among the end users, their jobs, and the services offered by the information centers. Supplementary to these recommendations are those guidelines set forth in Chapters 8, 9, and 10 for corporate management, IC professionals, and end users, respectively.

Integration of Interests of Organization Units by Corporate Management. In terms of organizing for effective micro computing, ABC's corporate management is responsible for giving direction to the IC's organization structure. On the other hand, the information centers provide the technical and advisory staff to support end users on computing. The end users of the functional business units have the authority for the implementation of computers within their units. These managers also have the ultimate responsibility for monitoring computer usage. This approach may not fit every organizational unit, but it answers the major concerns of the ABC Corporation. Nevertheless, the corporation's microcomputers tie in with the corporate climate by matching the skills of the different individuals. As such, the functional managers ensure that the micros address end-user needs.

Additionally, corporate management is also responsible organizationally for the micro-mainframe link to ensure data compatibility. Similarly, it has under its jurisdiction the integration of corporate databases between mainframes and microcomputers. While many microcomputers are used on a stand-alone basis today for the ABC Corporation, it is clear that they will need to communicate tomorrow. The communications will be to the corporate mainframe, to specialized minicomputers, to the corporate databases, to public databases, to other microcomputers, and to a variety of other services. The ultimate success of micros depends on corporate management's establishing an adequate communications infrastructure for tomorrow's microcomputer systems.

Organizational Changes to Meet End-User Needs. Essentially, the corporation's information centers need to move from a mostly technical role

toward a strategic approach—from dispensing technical information and training to providing solutions and support for organizational problem solving. This point has been stressed in the prior two chapters. There will be a related change in the role of IC professionals from providers and trainers of technical information to problem-solving partners. IC professionals need to think of themselves less as technical experts and more as business problem-finding—and problem-solving—collaborators. As end-user functional units evolve and mature, line management will increasingly expect this of information center personnel. In essence, their role and function will be no different from those of staff professionals.

These changes will be accompanied by a change in the perception that other staff and line personnel have of IC professionals. This perception is a critical factor in how change is handled, that is, it will move from curiosity (“Who are those people anyway?”) to consumer interest (“What are they doing and is it worth it?”). This change of thinking by IC professionals will go a long way toward rectifying many of the negative answers found in Part III of the IC questionnaire.

In addition, IC professionals must undergo changing perceptions of themselves as they move from a reactive role to a proactive posture. It is easy to be reactive when the focus is on keeping up with the demands. IC professionals will gain needed credibility by moving toward the more visible role of internal business consultant. In other words, IC professionals spend too much time worrying about end-user support; instead, they should invest more time in learning how to support them. “Do the latter and they’ll earn the former.” Or, as one veteran IC professional was overheard to say, “How can we expect senior management to understand us when we don’t understand them? And that’s more our job than theirs.”

CHAPTER SUMMARY

Essentially, this chapter has explored organization roles of IC professionals as well as the structure within and outside information centers along with some of their difficulties. In turn, this background was beneficial in developing an effective IC organization model to overcome current and future difficulties. Just as important, this background information was useful in developing Part III of the IC questionnaire, which was then applied to the ABC Corporation.

From another perspective, this chapter recognizes a need for an effective information structure which makes the most of the proliferation of microcomputers. If the IC structure is developed properly, a new constituency of computer-literate end users will be better able to articulate their needs and will have a means of improving their systems. By providing organizational support and technical expertise to end users as they choose, purchase, install, and use micros, an important opportunity is offered to both IC professionals and end users for improving relationships that will reduce computer conflict over time.

NOTES

1. William Feeney and Frea Sladek, "The Systems Analysts as Change Agents," *Datamation* (November 1977).
2. Seev Neumann and Michael Hadass, "DSS and Strategic Decisions," *California Management Review* 22, 2 (Spring 1980): 82-83.

SELECTED REFERENCES

- Adrian, M., "Stalking the Micro-Mainframe Link," *Information Center*, April 1986
- Batt, R. "Human Aspects of Managing Change Urged," *Computerworld*, November 21, 1983
- Cheney, P. H., R. I. Mann, and D. L. Amorosso, "Organizational Factors Affecting the Success of End-User Computing," *Journal of Management Information Systems*, Summer 1986
- Chester, J. A., "The Information Management Charter," *Infosystems*, April 1986
- Ciura, J., "A Guide to Establishing the Corporation's Information Center," *Information Management*, September 1985
- Doll, W., and M. V. Ahmed, "Tradeoffs in Selecting an Executive Steering Committee," *Journal of Systems Management*, January 1984
- Dorfmann, J., "Making the Most of User Groups," *Infosystems*, March 1985
- Efroymsen, S., "Sorting out the LAN Puzzle," *Information Center*, October 1985
- Gallant, J., "MIS Manager Must Become Agent of Change," *Computerworld*, November 13, 1983
- Goldberg, E., "Info Centers Wear Many Hats," *Computerworld*, December 16, 1985
- Greenberg, E. R., "What Drives IC Growth?," *Information Center*, July 1986
- Head, R., "Information Centers, Information Systems, Divided They Stand," *Computerworld*, April 15, 1985
- Horwitt, E., "Redefining the Information Center," *Business Computer Systems*, September 1985
- Johnson, R. T., "The Infocenter Experience," *Datamation*, January 1984
- Kador, J., "The IC As a Three-Credit Course," *Information Center*, June 1986
- Kahn, D. L., "Supporting Decentralized Users," *Information Center*, May 1985
- Karten, N., "The Importance of Communications," *Information Center*, July 1987
- , "Old Blueprints, New Structures," *Information Center*, March 1985
- Kelleher, J., "The Transformed Organization," *Information Center*, January 1986
- Kemske, F., "Marketing the IC," *Information Center*, June 1985
- , "State-of-the-Art IC," *Information Center*, April 1985
- LaMotta, T., "An Information Center As Change Agent," *Information Center*, January 1985
- LaMotta, T., and J. Bernknopf, "A Study in Departmental IC's," *Information Center*, September 1985

- Lindholm, E., "The IC Connections," *Information Center*, August 1986
- Mathieson, G. J., "Side-Stepping the Problems of Organizational Computing," *Information Center*, July 1986
- Paller, A., "Million-Dollar Applications," *Information Center*, February 1986
- Ramsay, M. L., "The Guerrilla IC," *Information Center*, July 1986
- Santarelli, M-B, "The Company Store," *Information Center*, February 1985
- Shidal, J. G., "Out of the Black Office," *Information Center*, November 1985
- Shoor, R., "Micro Managers: New Skills & Problems," *Infosystems*, January 1986
- Stokes, S. L., "The IC As Change Agent," *Information Center*, July 1987
- Sumner, M., "Organization and Management of the Information Center," *Journal of Systems Management*, November 1985
- Taylor, L., "39 Questions to Successful System Development," *Information Center*, February 1985
- Thierauf, R. J., *Decision Support Systems for Effective Planning and Control—A Case Study Approach* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1982)
- , *User-Oriented Decision Support System—A Problem-Finding Approach* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1988)
- Thierauf, R. J., and G. W. Reynolds, *Effective Information Systems Management* (Columbus, Ohio: Charles E. Merrill Publishing Company, 1982)
- Zuboff, S., "New Worlds of Computer-Mediated Work," *Harvard Business Review*, September-October 1982

5

STAFFING OF INFORMATION CENTERS

ISSUES RAISED AND EXPLORED

- To examine the organization's corporate culture as a way to assist end users when using an information center.
- To assess the profiles of typical IC professionals and end users as a source of potential conflict.
- To explore the appropriate criteria necessary to staff the information center effectively.
- To set forth Part IV of the IC questionnaire, which is useful in evaluating the effectiveness of IC staffing.
- To apply this fourth part of the questionnaire to the ABC Corporation to evaluate its staffing problems.

OUTLINE

Introduction to Staffing of Information Centers

Overall Consideration for Getting Started on Staffing the Information Center

Corporate Culture Defined

Examination of the Impact of Corporate Culture on MIS Activities

Use of Corporate Culture to Assist Information Center and End Users

Assessing the Expertise of Organization Personnel

Profile of a Typical IC Professional

- Profile of a Typical End User Utilizing an Information Center
- Differing Views on IC Professionals—Corporate Managers versus MIS Managers
- Redefining the Job of IC Professionals
- Use of IC Professionals as Change Agents
- Selecting Appropriate IC Professionals to Staff the Information Center
 - How to Staff the Information Center
 - How Not to Staff the Information Center
- Part IV of IC Questionnaire—Staffing of Information Centers
 - Major Sections of IC Questionnaire—Part IV
- ABC Corporation—Profiles of IC Professionals and End Users
 - Background on IC Staffing Problems
 - Evaluation of IC Staffing Problems
 - Recommendations to Improve Information Center Staffing
- Chapter Summary
- Notes
- Selected References

INTRODUCTION TO STAFFING OF INFORMATION CENTERS

Inasmuch as information centers are growing and extending their activities periodically, IC managers spend a great deal of their time planning, which includes hiring appropriate IC professionals. The temptation, of course, is to hire only as many people as the budget will support in hopes that they will all work out and that the information center will be able to proceed with its business. If that approach succeeds, however, it is only by chance. Effective staffing is possible only if the IC managers consider what the information center is and where it is going. IC staff members, after all, are the center's primary resource, and they are going to be helpful in selling the information center concept. The purpose of this chapter is to describe a strategic approach to staffing that can be both permanent and flexible at the same time.

Initially, the focus of the chapter is on examining the corporate culture in which information centers will operate, followed by assessing the expertise of a typical IC professional and a typical end user. Because the typical IC professional will need to act as a change agent in his or her dealings with end users, the job of being an IC staff member is redefined from this viewpoint. Next, the way to staff an information center is contrasted with a way not to staff the center. Using the material set forth in the chapter, Part IV of the IC questionnaire is developed, followed by its application to the ABC Corporation.

OVERALL CONSIDERATIONS FOR GETTING STARTED ON STAFFING THE INFORMATION CENTER

A logical starting point in terms of staffing a typical information center initially means standing back and obtaining an overview of the total corporation. Typically, when this is undertaken by corporate management, the focus is on examining the corporate culture that is found in the organization. Due to its importance, it is defined below, and its impact on MIS activities is described. In addition, the use of corporate culture to assist information centers and end users is examined.

Corporate Culture Defined

In the past, the emphasis has been placed on the tangibles and observables. "If you can measure it easily, it must be important" and "If you can observe it, it should be managed" are the unwritten rules that have prevailed. In the past few years, there has been a growing recognition that some of the most important things to study and manage cannot be seen or touched directly.

Corporate culture is the invisible force behind the tangibles and observables in any organization, a social energy that moves the people into action. It is to the organization what personality is to the individual—a hidden, yet unifying theme that provides meaning, direction, and mobilization. Organization charts and employee manuals are simply not enough to get members to work together. Operationally, corporate culture is defined as shared philosophies, ideologies, values, beliefs, expectations, and norms. These are seldom written down or discussed but are learned by living in the organization and becoming a part of it.

Corporate culture fills in the gaps between what is formally decreed and what actually takes place. Culture thus determines how formal statements are interpreted and provides what the written documents leave out. The surest way to kill an organization is to have all members follow every written rule to the letter. The best way for corporate managers to make a company successful is to have a culture that influences all members toward the most effective approach, attitude, and behavior on the job as a collective, tacit agreement.

If one observes blue chip corporations, such as IBM and P&G, their corporate cultures seem to keep them constantly facing outward. Most companies like this tend to guard against the danger of complacency by having one element of their culture related directly to their performance in the marketplace. For example, McDonald's has an obsessive concern for quality control, IBM for customer service, and 3M for innovation. In addition, the central corporate culture concern may point inward rather than outward—as seems to be the case, say, with Delta Air Lines's focus on "family feeling." No matter the orientation by corporate managers, the corporate

culture serves as a basis for sharing values and beliefs that are important to produce the desired behavioral norms of the organization.

Examination of the Impact of Corporate Culture on MIS Activities

Although corporate culture is generally not thought of as relating to organization-wide MIS activities, it is (in reality) since corporate culture specifies how things are done in computerized areas and elsewhere. A corporation should not count on computer technology alone to carry harmony and productivity into the workplace. The issues are primarily behavioral. A company adopting microcomputers should decide how personal computing will promote characteristics it wants to foster and pare those that are undesirable. Corporate managers and computer professionals alike must perceive good reasons for acting in a particular manner. If the corporate culture as developed by corporate management does not provide an incentive for creative, responsible computing, it will not happen automatically. For example, a new electronic mail system can be installed and memos can be circulated asking employees to begin communicating in this manner, but if employees are not used to sharing, they will not use the system; they will not trust the new system.

A strategic campaign by corporate management to alter the organization's behavior is required in such cases. Needless to say, it will not be an easy task. Attempts to change long-established patterns must reverse a natural momentum and, sometimes, overcome entrenched interests. MIS has traditionally been centrally controlled. New activities, like information centers and end-user computing, tend to undo the status quo. No matter how they are handled, there will be defensive reactions by the MIS department, not to mention end users.

Use of Corporate Culture to Assist Information Center and End Users

Closely related to the corporate culture of the MIS department is that relating to the end users. As indicated, the typical MIS department prefers the status quo and tends to overreact owing to their centralized structure. Hence, MIS managers look upon their information centers and the autonomy of end users as real threats to their authority as well as their territory. As a result, they institute strict policies for end users to follow that meet their perceptions of what end users need.

When strict policies, such as restrictions on the hardware products that can be purchased by end users, are established, they can create the very resistance they are meant to counter. End users are apt to feel that IC management is infringing on their rights to structure their own computing, i.e., their own thought processes. As such, they are apt to overreact. Corporations that do not approach these conflicting interests with sensitivity

risk losing many of the advantages of personal computing. In the end, the organization corporate culture is worsening in the eyes of end users. Some end users may feel that they should look elsewhere for employment.

Though organizations have legitimate reasons for centrally controlling personal computing, most management experts favor a relaxed attitude, particularly during the early stages of adoption, when individual creativity is likely to pay the greatest dividends. When managers want end users to think about new ways to use personal computing tools as competitive weapons, they should step back and let ideas flourish.

Overall, attempting to regulate personal computing within a corporate culture framework is like trying to tell end users how to take notes, arrange their desks, decorate their offices, and think about the problems they are asked to solve. The microcomputer holds out the promise of new, better solutions. But these solutions are the products of individuals who, even as they contribute them to the corporate good, will feel the pride of creation. Organizations should respect these feelings by acknowledging the contributions and granting end users adequate freedom to produce them by letting the prevailing corporate culture assist them by interacting with an effective information center.

ASSESSING THE EXPERTISE OF ORGANIZATION PERSONNEL

Once the total organization environment has been examined, in particular the corporate culture, the next logical step is to discuss the typical organization person who will be using the information center. In turn, this information is useful in staffing the information centers with appropriate computer professionals from the MIS department. Hence, there is need to know what are the typical attitudes of the average end user and the typical IC professional who staff the information centers. The background of both groups will indicate not only the potential for conflict, but also the traits the groups hold in common. In view of these comments, profiles of a typical IC professional and a typical end user are given below.

Profile of a Typical IC Professional

Over the years, considerable time and effort have gone into defining the profile of a typical MIS professional. Inasmuch as an MIS profile does exist and can be observed in one form or another in many MIS personnel, it would be quite useful to understand the nature of that profile since these professionals currently staff the information centers.

Elements of a Typical IC Professional Profile. A number of elements are representative of an IC professional profile. Although the profile described below may not match the ones in the reader's organization, they are the ones typically found in most information centers today. They are as follows:

- *The individual tends to be very perceptive.* Since this individual is intellectually curious, he or she has a good problem-solving ability.
- *The individual tends to be more serious and reserved than end users.* He or she may be introspective and reserved, preferring to conceal his or her feelings. Choices are made to reflect conservative tastes and values where stable life situations are preferred over risk taking.
- *The individual tends to be more cautious and hesitant than end users.* He or she tries to steer clear of threatening situations, thereby avoiding challenges on the personal front.
- *The individual tends to be persevering, even dogmatic.* He or she is reliable in assigned activities and prefers adherence to established practice, resulting in some inflexibility.
- *The individual tends to be pragmatic.* He or she is used to dealing with concrete facts and to thinking in conventional terms. Being concerned with immediate issues and problems, the individual sometimes takes a narrow point of view. The time horizon is shorter than for end users.
- *The individual is straightforward and to the point.* He or she prefers to be open, frank, candid, and sometimes even blunt. The individual may lack empathy in dealing with end users.
- *The individual is anxious and, many times, uncertain.* He or she may harbor unrealistic feelings of inadequacy and may be distracted by moods of defeat or failure. More often than not, the individual worries over past mistakes and seeks approval of others.

An analysis of the foregoing elements of a typical IC professional indicates a specific profile. This profile shows the IC professional to be skillful in problem solving and happier with tasks that are not perceived as simple or routine. Short-term projects or tasks are the individual's favorite concern. There is a clear, almost dogmatic focus on completing such tasks. Project management and standards can be seen as roadblocks in the way of getting the job done. They require that time be spent in filling out paperwork, and they limit the range of choices available in solving a particular problem for a particular project. Other characteristics of this profile suggest that the IC professional is anxious and uncertain and may value public opinion. He or she does not want to be a party to failure and prefers to stay with established ideas. Research indicates that the IC professional needs to get a considerable amount of routine feedback. Finally, the individual tends to be less loyal to their employers than to their profession.

Profile of a Typical End User Utilizing an Information Center

The profile of a typical end user is not only quite different from that of an IC professional, but also much more difficult to describe since there is such a wide range of end users, including marketers, engineers, researchers, accountants, office workers, production workers, and many others.

Due to the wide range of potential end users in a typical organization, it would be helpful to gather information on the end users themselves by using random sampling.

The initial step would be to interview the random sample and find out what they do, where they fit in the organization, how critical their functions are to the organization's success, and what information they need for decision making. In addition, the end users should be asked what the newer computer technology is going to do for them, how they feel about using microcomputers, how they feel about their abilities to learn something new and possibly complicated, and how much exposure they have had to computers. It is important that as much information as possible be gathered in personal interviews; some things may have to be coaxed from people or deduced from a combination of verbal responses, body language, or information that cannot be garnered in a written survey. An intensive evaluation of the foregoing factors will allow one to determine the typical profile of the end user.

Elements of a Typical End-User Profile. Because the various disciplines found in an organization produce different profiles, it is next to impossible to generate one that is representative of the entire organization. In its place, it is better to think in terms of how an end user views microcomputers and related software, from their initial contact with both hardware and software to day-to-day operations. In a sense, this approach is another way of viewing an end-user profile.

Although IC professionals generally have no problem understanding the use of microcomputers, the same cannot be said for end users. As with most technology, the reaction to micros by end users moves in four distinct phases: (1) fear, (2) ecstasy, (3) disillusionment, and (4) cold reality. *Fear* develops because the micro is an unknown. "Everyone else seems to be using them, but I don't understand what they do or how I can use them. I'm a little afraid." The second stage, i.e., *ecstasy*, occurs when the end user learns to use the micro. The elation with conquest gives the users evangelical zeal. Eventually, the thrill wears off. The end user during this third stage, or *disillusionment*, gets back to reality and comes to realize during the fourth stage, *cold reality*, that the micro is just another tool. It does many business chores well, but its uses are somewhat limited. That is, the micro is useful for word processing, spreadsheet analysis, ability to use a database or two, and comparable items. It may also serve as a terminal for entry into a computer mainframe. Despite the micro's limitations, it has become indispensable to the typical end user. From this broad-based view, the typical end user differs significantly in how he or she views microcomputers versus the professionals who staff the information centers.

Differing Views on IC Professionals—Corporate Managers versus MIS Managers

From another perspective, it would be helpful to examine how corporate managers view IC professionals versus their own MIS managers. MIS

managers and company vice-presidents do not always agree when they are asked: "What makes a good data processor." The fifty Fortune 1000 vice-presidents polled in a survey conducted for Robert Half International, Inc., by Burke Marketing Research of Cincinnati tended to define a "good data processor" according to skills; MIS managers favored personal attributes, such as logic and communications. These results are equally applicable to the typical IC professional.

MIS managers (40 percent) versus corporate top managers (18 percent) cited lack of motivation as the reason data processors fail to get ahead in companies. On the other hand, corporate top managers leaned toward personality deficiencies (30 percent) as the reason for failure to get ahead in companies. Also, corporate top managers felt strongly (76 percent) that they and their peers should have a "working knowledge" of data processing procedures. Only 60 percent of the MIS managers agreed with that suggestion. Meanwhile, the MIS managers (72 percent) disagreed more than the corporate top managers (54 percent) with the suggestion that data processors lack imagination.¹

An examination of these statistics indicates there are differences between what corporate top management and MIS managers feel about IC professionals. If one took a poll of what end users would like to see in an IC professional, the percentages would differ from those given above. An evaluation of these research results and others is that everyone has a different perspective. As the old saying goes, "Difference of opinion makes the world go around." But more importantly, these differing viewpoints can result in conflict between organizational personnel at all levels and IC professionals.

REDEFINING THE JOB OF IC PROFESSIONALS

In Chapter 4, reference was made to a number of organizational roles that the MIS department can undertake to assist end users, included acting as DDP consultants, DSS change agents, and DSS coordinators. In turn, reference was made to the use of IC professionals acting as change agents. Because this chapter focuses on staffing the information center, further discussion on this important topic is set forth below.

As a starter, an IC professional needs more than just technical skills to be an effective IC staff member. What the individual needs is an understanding of what *consulting* is all about. The question can be asked: "What is the role of the information center consultant with a technical background?" Webster's defines "technical" as "having special and usually practical knowledge especially of a mechanical or scientific subject" and "technology" as a "technical method of achieving a practical purpose." The individual's purpose, then, is getting what end users want in a way that works.

An important aspect of this whole process is understanding that consulting is not the same as educating or advising. Educating means giving

the clients basic knowledge or information and advising means making recommendations about steps they should take based on the advisor's perspective. In contrast, consulting means finding out what clients want and advising the most practical way for them to get it. Knowing when to do each is critical in the job of IC professionals. The bottom line is this: "To be effective, the job of IC professionals is to accept their responsibilities as professional communicators." Because the consultant role is different from the technical one, IC professionals must be technically skilled both in computer technology and interpersonal communication technology. Acquiring consulting skills involves something more than acquiring new information; it means acting in a certain way, and it might even mean changing one's behavior. The change can be well worth the time and effort.

Use of IC Professionals as Change Agents

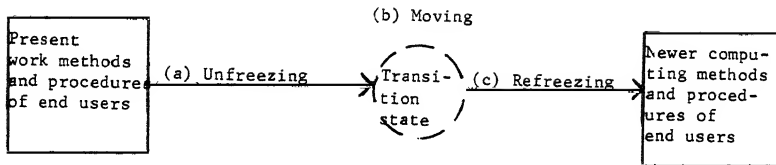
As IC professionals take on the new role of consultant, they must also think of themselves as instruments for changing the organization for the better. As such, they must go a step further and think in terms of acting as *change agents*. To facilitate the changing of work habits of end users, there is need to employ a model for changing the behavioral patterns of end users.

Before presenting the model, several comments are in order regarding computer technology and end users. Stereotypes and biases to the contrary, end users rarely resist technology; rather, they resist the way in which technology changes their lives. Change is a process of transition, and transitions do not happen overnight. When a person loses a loved one, for example, the change in that person's situation takes place instantly, but the psychological change takes a significant period of time, requiring a period of mourning and other adjustments. Change works the same way in organizations. A new end-user computer system can sometimes be installed overnight, but the acceptance of it by end users whose jobs it changes can take a long time, if it occurs at all. To a large degree, the same reasoning can be applied to the development of computerized systems by end users using information centers.

Utilization of the Lewin-Schein Model. A basic framework for effective behavioral and organizational change has been set forth by K. Lewin and E. Schein,² who view change as a three-stage process. For a change program to be effective, each of the following stages must be internalized by the individual, i.e., the end user:

- *Stage 1: Unfreezing.* In this initial, unfreezing stage, an environment for change is created, and some type of reason (or pressure if deemed necessary) is applied to bring about a change in the individual's attitudes and/or habits. The unfreezing stage is critical to the change process since inadequate acceptance of change can prevent movement toward a desired state.

Figure 5-1
Lewin-Schein Model



- *Stage 2: Moving.* In the movement stage, attitudes and/or habits are moved toward a desired state.
- *Stage 3: Refreezing.* In the refreezing stage, attitudes and/or habits are refrozen in the desired state, to be unfrozen again when the next change process occurs.

Within the foregoing framework—illustrated in Figure 5-1—change must be backed by corporate management. More importantly, change must be self-motivated. IC professionals who take the responsibility for the change must be committed to the newer and better ways of end-user computing; otherwise, the desired change will not be effected. Also, there must be an accommodating environment that is supportive of the change. Hence, there are important implications for developing newer computing methods and procedures of end users.

Overall, IC professionals, when acting as change agents, are responsible for implementing the change. They are not responsible for legitimizing the change nor do the change agents have the authority to cause the change to happen. They are, however, responsible for professionally administering a planned and orchestrated across-the-board shift in expectations by employing people-oriented skills, such as coordinating, informing, questioning, listening, and training. The end result is that the *change target* is directed toward end users who must actually change.

SELECTING APPROPRIATE IC PROFESSIONALS TO STAFF THE INFORMATION CENTER

As discussed previously, an information center should represent a balance among those possessing technical expertise; those with good people skills; those who can package and present the concepts in training, programs, and seminars; and those who know what it is really like to work in the organization and who have empathy with their fellow users. This blending of background and experience offers a more cohesive approach to integrating end-user computing into an organization.

It is logical to recruit IC professionals from the MIS department to staff information centers. Some of them can be looked upon as generalists, who

recognize applications and needs, propose solutions, and sell the information center to prospective end users. These generalists can then turn the users over to a product consultant, who specializes in one or more software products. In this manner, the end users get the detailed hardware and software information that they need to solve specific problems.

Going beyond the MIS department, there may be a need to recruit internal candidates from the ranks of non-MIS personnel. Many organizations are discovering they have end users who are self-taught micro experts. It is not unusual, particularly in organizations lacking formal support programs, to discover these employees emerging as "resident experts." They understand what their coworkers feel and experience when they sit down at a keyboard. Such individuals can contribute both insight and credibility to the training and support process. They also have the advantage of knowing something about how the organization functions, the nature of its business, and its management style. Equally important is the fact that non-MIS personnel can help reduce or eliminate potential or actual computer conflict between the information center and the end users.

How to Staff the Information Center

In the prior discussion, a number of desirable attributes were set forth for IC professionals. This part will be complementary to the prior comments in that the desired attributes will be related to other IC-related factors. As a starting point, staffing strategies should be developed based on the information center's stated objectives. How can end-user information technologies be supported, for example, which contribute to the achievement of corporate goals? To meet this objective, the information center must understand the business goals and strategic direction of the information center user base. The IC professionals should have a solid business exposure and be able to think beyond short-term automation needs. It also helps if they have skills in dealing with an organization's political realities and effectively communicate sound strategic uses of information.

Next, the IC professionals must have a solid understanding of the *critical success factors* of their users. As indicated above, former end users with business exposure to these factors that are critical to an organization's success can make good IC professionals when properly trained in the technical aspects of the work. It is also advisable for the IC professionals to know the organization's data sources and the patterns of information flow from the various sources to each user group.

IC professionals should be strong in all facets of interpersonal communications. Establishing trust and training end users effectively both in classroom settings and one-to-one tutorials requires a "people orientation" quite apart from business and technical knowledge. For the IC professionals, this talent is probably more important than any other because of the close interaction with all types of end users. Combined with business

savvy, communications skills constitute the nontechnical side of consulting, which is indispensable for a successful information center.

On the technical side, consulting skills are also important. It is recommended that all consultants adhere to a structured consultation cycle, which begins with problem definition and moves through data collection and diagnosis, solution recommendation, and evaluation. A technical knowledge of IC tools and capabilities is imperative. Finally a strong working relationship with management information systems and a knowledge of outside data processing resources will help the IC professionals recognize when the best solution to a problem lies outside the information center.

How Not to Staff the Information Center

In the prior discussion, the accent was on the right way to staff information centers. There is also a wrong way to staff the centers; for example, take the IC manager who tried a new approach to staffing. He was not interested in people with a technical background because he felt many of them lacked the people skills necessary to introduce successfully computer technology. Instead, he recruited a staff that was young, bright, articulate, and aggressive, who had a competency for—but no background in—computer technology. Also, he recruited some as if he believed that there was a direct corollary between good looks and acceptance of problems and ideas. He felt that “handsome people who dress well and look sharp are more likely to be successful in getting others to accept what they have to say.” There was little doubt that the people he gathered around him met these criteria. The information center staff was soon the talk of the local information centers as people marveled at the caliber of talent that he seemed to have attracted. Everyone was also quick to notice how sharp these people looked. “If you want to see how a staff should look,” one information center manager mused, “go look at that new information center.” Overall, it seemed as if the IC manager had discovered the right combination of factors for putting together an information center staff.

However, in a relatively short time, the realities of selecting the wrong people soon became apparent, that is, there is need for the IC professionals to have a certain amount of technical expertise. This was certainly apparent after a short period of time to end users.

From another perspective, the next matter for discussion is the end users that will be served. Inquiry into this matter resulted in the following reply: “Our focus is on senior management. We want to show them how they can benefit from our programs and use of the computer. We have a very select clientele.” From these comments, the information center is seen as an extension of the management process instead of a tool to help end users perform their jobs better. When the information center members were quizzed further, the response was: “Management needs the information processing power that computers alone can provide. Our role is to manipulate the

information to help them make their decisions." Based upon the foregoing comments, this information center perceives its role as a way of assisting management in making better decisions more quickly. Their focus is on those who plan the long-term strategies for the company. The information center is seen as an extension of senior management and a few select others. Information centers, microcomputers, and access to corporate databases, then, were never intended for the masses.

The rationale given for this approach to the information center is that there are some real opportunities here for assisting senior management. As one person stated: "We are becoming an information society, and that implies that those who control the flow of information will play vital roles in determining the future of many organizations. The future CEOs of many companies will not come from finance or marketing departments, but they will come from information centers and MIS departments. What we are doing here is laying the foundation for better management, by exerting control over the processing of data, and then directing that data to solve the problems of strategic planning. You don't give that kind of power or responsibility to just anyone, and that is what makes information centers so special. Just watch what we do with it."

The major flaw in this approach is that the information center was not conceived to interfere with the free flow of information within organizations. But rather, information centers are a way of increasing participation in the management and decision-making process by making access to data available to a wider number of end users. Such an approach to information centers allows end users to explore new ways of looking at their jobs, thereby introducing them to new technologies that free them to become more creative. The concept of personal computing is an outgrowth of the desire to increase productivity by involving people more in their own jobs.

In summary, the approach taken here is the emergence of a new elite that believes its role is to consolidate information and decision-making powers. This is a dangerous and Machiavellian approach that has no place in the staff support functions of an information center. This IC staff serves a narrowly defined constituency and will probably end up by believing that their judgments are the only ones that can be trusted. In short, they represent a new "technological aristocracy" that will serve only themselves and their own interests. Needless to say, they have sown the seeds for conflict in the immediate future, especially among the end users who were excluded from using their services.

PART IV OF IC QUESTIONNAIRE—STAFFING OF INFORMATION CENTERS

The first questions in Part IV of the IC questionnaire focus on the overall aspects of staffing an information center. The next questions consider the linkage of the corporate culture to IC staffing. As stated earlier in the

chapter, corporate culture is a set of shared values, norms, and beliefs that head everybody in the same direction, one that is common to all in the company. Next, questions concerning information center staffing are set forth, followed by sections on the training of IC professionals and the motivation of IC personnel. This orderly presentation brings together the essential aspects necessary for evaluation of the information center staff.

Underlying these staffing questions is the ability of IC professionals to work one on one with end users. The IC staff needs to be adept at assisting users with breaking problems and requirements into component parts, developing viable alternatives, and synthesizing the various alternatives into a workable and total solution. At this point, the software approach to implementing the solution may be either end-user computing or traditional application development. The IC professional needs to know which approach is more appropriate in each case.

Other staffing questions focus on the ability of IC professionals to teach the supported products, to perform effective consulting and problem solving with end users, to assist with questions, and to evaluate proposed new products. It should be noted that some information centers extend this further to include developing applications for or with their end users. To develop the applications for certain users, however, risks becoming entangled in deadlines and commitments at the expense of providing adequate consulting support to other users.

Major Sections of IC Questionnaire—Part IV

The major sections of Part IV are related to the previous ones on the organization structure of the information center, that is, there must be a defined structure before the information center can be staffed. Its essential sections are as follows:

- Section A. Overall IC Staffing Considerations
- Section B. Linkage of Corporate Culture to IC Staffing
- Section C. Information Center Staffing
- Section D. Training of Information Center Professionals
- Section E. Motivation of Information Center Professionals.

These sections of Part IV are shown in Figure 5-2. Fundamentally, the major thrust of these five sections is how well the information centers have been staffed to meet end-user needs. Such an evaluation is found in the master case study that follows.

Figure 5-2

Part IV of the IC Questionnaire—Staffing of Information Centers

	Yes	No	N.A.
Section A. Overall IC Staffing Considerations:			
1. Does the MIS department recognize the importance of acquiring the best-suited computer professionals to staff the information center?	_____	_____	_____
2. Does the MIS department encourage its IC professionals to consider the information center as a desirable career opportunity?	_____	_____	_____
3. Is assignment to the information center considered to be a promotion rather than a demotion?	_____	_____	_____
4. Does the information center's staff understand the behavioral problems of working with and through people?	_____	_____	_____
5. Are computer professionals who are assigned to the information center considered to be capable of resolving or, at least, reducing computer conflict?	_____	_____	_____
6. Is the information center reviewed periodically by an independent third party to ensure proper staffing?	_____	_____	_____
Section B. Linkage of Corporate Culture to IC Staffing:			
1. Is there an attempt by the MIS department management working with IC management to understand the implications of corporate culture as it affects the information center?	_____	_____	_____
2. Does MIS management working with IC management try to understand the differing profiles of IC professionals and end users within the context of the organization's corporate culture?	_____	_____	_____
3. Is there a relatively good match between the staffing of the information center and the end users when related to the context of the organization's corporate culture?	_____	_____	_____
4. Is there an attempt by MIS management working with IC management to match IC professionals with end users when there is a shift in the corporate culture?	_____	_____	_____
Section C. Information Center Staffing:			
1. Is the information center staffed by experienced IC professionals?	_____	_____	_____
2. Are these IC professionals really receptive to helping current end users in meeting their computing needs?	_____	_____	_____
3. Do these IC professionals seek out and assist new end users in effective microcomputer usage?	_____	_____	_____

Figure 5-2 (Continued)

	Yes	No	N.A.
4. Is the information center reviewed periodically for the appropriate number of IC professionals?	_____	_____	_____
5. Is the information center reviewed periodically for the appropriate mix of systems analysts and programmers?	_____	_____	_____
Section D. Training of Information Center Professionals:			
1. Is there a training program to ensure that IC professionals are current in terms of micro hardware and software advances?	_____	_____	_____
2. Is there a training program to ensure that IC professionals are current in their respective area of expertise if they choose to return to the MIS department?	_____	_____	_____
3. Are outside training costs of IC professionals (i.e., attending computer meetings and conferences) an integral part of the IC's coming year budget?	_____	_____	_____
4. Does training of IC professionals relate to the need to resolve or, at least, reduce computer conflict with end users?	_____	_____	_____
5. Is training of IC professionals reviewed periodically by an independent third party to ensure that it is adequate?	_____	_____	_____
Section E. Motivation of Information Center Professionals:			
1. Is there a means for motivating information center professionals on the job?	_____	_____	_____
2. Are motivation techniques utilized to keep information center professionals motivated?	_____	_____	_____
3. Are IC professionals rotated on a frequent basis to overcome boredom caused by job monotony (e.g., repetition of the same questions and problems from end users)?	_____	_____	_____
4. Do IC professionals feel free to discuss motivational issues with their supervisors?	_____	_____	_____
5. Is a periodic review (e.g., every six months) employed to ensure that IC professionals are making progress on their jobs?	_____	_____	_____

ABC CORPORATION—PROFILES OF IC PROFESSIONALS AND END USERS

From the very beginning, the five information centers of the ABC Corporation have supported a mixture of microcomputer and computer mainframe

tools. The microcomputer is viewed as both inevitable and valuable; that is, it is also viewed as a workstation and not as a stand-alone box. The standard workstation for end users consists of a microcomputer with 512K bytes of memory, a color monitor, a 3278 interface, and a modem. Clients are taught to use the microcomputer alone for small problems and as a terminal connected to the mainframe for large ones. Software has been selected to provide similar functions on both the micro and the mainframe. Generally, these functions are analysis and modeling, database query, report writing, graphics, and communications.

As part of its services, the information center demonstrates the software and hardware it recommends to clients. Until now, however, the center has not offered to loan equipment on a trial or pilot basis to new users. After evaluating this posture, the information centers have decided to begin a limited loan service. The centers do provide a small courtesy terminal room where users can try the various tools. Although the information centers do not have the authority to dictate which tools to use, they limit their tools to a manageable size. Therefore, the centers have a simple policy: If clients use the tools recommended by the centers, the door is always open, and the centers provide complete and comprehensive service. If clients use another brand of their own choosing, the centers provide only minimum service and then only after meeting the needs of its regular users.

During the first two years, the information centers concentrated on bringing analysis and modeling, limited query, report writing, and graphics to the user population. Software was readily available for these functions, and applications that justified the investment in equipment and training were easy to identify. Of these tools, the microcomputer spreadsheet proved the most popular, based on the numbers of users trained. Mainframe database query and report writing required the most technical assistance. Microcomputer consultation, which encompassed such services as providing an overview of what a microcomputer is to helping fill out purchase orders and even in installing equipment, was the most time consuming.

Hourly billing for standard services of the information centers is used. Under the system, the end user pays for training and the initial request for technical assistance. After startup, however, the users try to cut costs by doing all the work on their own and possibly attempt applications that are not suited for end-user computing or that duplicate what others have already done. Moreover, the only situation in which a center can guide end-user computing effectively occurs when a user feels free to talk to center personnel at any time and trusts their recommendations. Thus, the present method of billing the end users has had a negative effect on assisting many of the corporation's end users.

From the foregoing comments on past and current operations, a profile of both IC professionals and end users is beginning to emerge for the ABC Corporation. Basically, the IC professionals tend to be cooler and more

impersonal than end users. They often prefer to be aloof when dealing with others, prefer to deal in precise terms, and are often preoccupied with small details. End users, on the other hand, are used to generic terms and prefer to avoid the excessive detail required of software packages.

Additionally, the attributes set forth previously are applicable to IC professionals; that is, they tend to be perceptive, serious, cautious, perserving, pragmatic, candid, and anxious. Above all, they are skillful about micro software, which is helpful to end users in problem solving. The end users, on the other hand, tend to follow the four distinct paths mentioned previously in the chapter, namely, fear, ecstasy, disillusionment, and cold reality. Overall, both groups are representative of typical organizational personnel found in a corporation of this size.

Background on IC Staffing Problems

As indicated in the prior discussion, there are quite noticeable differences between the IC professionals and the end users, which have been a major cause of problems between the two groups. Equally important, these problems have been at the core of the staffing problems of the five information centers. Current staffing problems are explored in the next section where Part IV of the IC questionnaire is applied. To assist in providing answers to these staffing problems, it would be helpful to look further into the working relationship between the two groups. Currently, the two groups are beginning to work together. With the widespread usage of micros throughout every level of the corporation, even to the carpeted confines of the president, end users have, in effect, become knowledge workers who demand more and better information to perform their jobs effectively. They are now better aware of computers and their capabilities. The users want new tools and they want them as soon as possible. They have an increased perception of the computing services that they are getting, and they know when the information centers are not doing their job.

The implication is that the successful IC professional will combine his or her technical skills with the ability to understand the needs and responsibilities of end users. For example, the IC managers need to balance the need for computing services and make end users aware of the importance of information services. These IC managers must achieve a high profile within the organization. They must be viewed as leaders and not simply as highly technical people. It is imperative that they learn who is important within the corporation and how to get things done. To be successful, the IC managers must act as agents of change to effect a working relationship between IC professionals and end users. This working relationship can be hampered by profile differences, but this need not be.

One typical way for IC managers to effect this working relationship between IC professionals and end users is to put into effect this one important management principle: "Employees will not adapt to technological change

unless they perceive that the change is personally beneficial to them." It is not enough for IC managers simply to appeal to the need for the organization to change or assume a new level of technological competence. Being creatures of habit, end users fear and resist change that disrupts the way things have always been done. It is not really the technology they oppose as much as the way the technology changes their lives. Additionally, it does not pay to hide the amount of disruption that will occur. As long as disruption does not cause total mayhem, beginning it early, although painful in the short run, can accelerate a person's ability to adapt to that change over the long term.

Overall, the most prevalent factor in an effective working relationship between IC professionals and end users is the active commitment by both groups. When the corporation is involved in a major technological change, i.e., widespread usage of microcomputers, that significantly disrupts the standard operating patterns, high levels of commitment are essential in the following roles:

- *The change sponsors* - the information centers that legitimize the introduction of technology.
- *The change agents* - the IC professionals who are responsible for implementing the technology.
- *The change targets* - the end users who must use the new technology.

Hence, there is a need for commitment by IC professionals and end users in their important roles; otherwise, failure typically will be the order of the day.

Evaluation of IC Staffing Problems

Based upon the foregoing discussion of IC professionals and end users as well as other information given, we are now in a position to evaluate Part IV of the IC Questionnaire (refer to Figure 5-2) to determine the real staffing problems of the information centers. All "no" answers have been listed in Figure 5-3.

In reference to Section A, Overall IC Staffing Considerations, half of the questions were answered negatively. According to the response from question 3, assignment to the information center is not considered to be a promotion or demotion. The feeling is that some MIS departmental personnel must staff the five information centers. In terms of questions 4 and 5, IC professionals have not been trained in the behavioral aspects of their jobs. They tend to feel that conflict between themselves and end users is not their concern since it is outside of their control. Hence, such conflict is typically ignored.

The next section, Section B, centers on corporate culture and the actual staffing of the five information centers. Question 3 has been answered

Figure 5-3

Explanations for the "No" Answers in Part IV of the IC Questionnaire—Staffing of Information Centers (see Figure 5-2)

Section A. Overall IC Staffing Considerations:

- A.3. Although assignment to the information center is not considered a demotion, neither is it considered a promotion, but rather a job slot that has to be filled.
- A.4. To a large degree, the IC staff does not understand fully the importance of working with and through people effectively since they have not been schooled in interpersonal skills.
- A.5. Because IC professionals are not schooled in the behavioral aspects of their jobs, they tend to think that computer conflict between themselves and end users is something they have no control over.

Section B. Linkage of Corporate Culture to IC Staffing:

- B.3. Because of the differing profiles between the typical IC professional and the typical end user, both MIS and IC management fail to understand how to relate the organization's corporate culture to staffing the information centers.

Section C. Information Center Staffing:

- C.3. Even though IC professionals have been trained to seek out and assist new end users in effective microcomputer usage, they do not perform the task on their own.

Section D. Training of Information Center Professionals:

None of the questions were answered no.

Section E. Motivation of Information Center Professionals:

None of the questions were answered no.

negatively since a relatively good match between IC professionals and end users does not exist when it is related to the context of the organization's corporate culture. In order for there to be a good fit, this factor must be taken into consideration when hiring and recruiting IC professionals. A good fit among the IC professionals, their jobs, and the corporate culture should help to reduce current and potential conflict as more jobs become computerized. For example, when the organization is forced to eliminate jobs and put the displaced workers, i.e., end users, through sometimes difficult computer retraining, end users reinterpret the organization's value of secure employment and build a new belief that they are obliged to keep themselves well trained. Within this context, end users see themselves coming out ahead despite the extra work involved. However, a comparable

approach is not found in the information centers. End users must perceive themselves as coming out ahead in most situations when interfacing with IC professionals.

In the remaining three sections of the questionnaire, only one question was answered negatively: question 3 in Section C, that is, the lack of initiative by IC professionals to seek out and assist end users. Essentially, they have not been trained to do so. Also, the time constraint of their jobs dictates that too much promotion of the information centers will lead to a tremendous increase in the number of end users. Although Section D, Training of Information Center Professionals, and Section E, Motivation of Information Center Professionals, indicate no major shortcomings, there are the eternal problems of providing the proper level of training for IC professionals and motivating them sufficiently to deal with difficult end users. Needless to say, these areas can change from a positive response today to a negative one tomorrow.

Recommendations to Improve Information Center Staffing

Recommendations for improving information center staffing for the ABC Corporation can take several directions. For the *first* one, it can center on improving the behavioral skills of IC professionals. From a *second* perspective, it can center on a different approach to assisting end users, thereby enlarging the system capabilities of end users. Or still, from a *third* perspective, IC professionals could be trained in the use of corporate culture to help them integrate their interests with those of the end users. Although each of these areas is explored below, a number of recommendations in the form of guidelines could be included. Such guidelines are set forth in Chapters 8, 9, and 10 for corporate management, IC professionals, and end users, respectively.

IC Staffing Related to Improving Behavioral Skills. As noted in the text previously, end-user computing is likely to become the dominant means of delivering computer resources in the near future. It has already affected the way in which the ABC Corporation conducts business and organizes its MIS and end-user departments. The five information centers have already proven their worth in helping to make this new technology widely accepted. On the other hand, because the technology and the procedures for employing end-user computing are relatively new, many unexpected challenges—accompanied by a certain level of conflict—confront the IC professionals of the five information centers.

In light of this fact, the corporation's IC professionals need to undergo training not only to act as effective change agents, but also to improve their interpersonal skills and to understand why people behave in the way they do under certain conditions when IC professionals work with them. A better understanding of end users from a behavioral viewpoint will enable IC professionals to overcome many of the "no" answers found in Part IV of

the IC questionnaire. This specialized training, then, will help IC professionals work better with and through end users effectively.

Enlarging the System Capabilities of End Users. Problems of IC staffing can also be solved by having the end users do more of the system development work, that is, letting them get involved in prototyping. Currently, large applications for the microcomputer are generally prototyped by the IC professionals in the information centers. Briefly, prototyping is a quick, preliminary version that is built as a feasibility test and a basis for learning and evaluation. Too often, though, the prototype becomes a full-blown project because it grows or drifts without clear cutoff points.

For a code of good practice, recommended prototyping steps are (1) preliminary analysis, which involves interviews with end users and produces a general description of the application and an evaluation of feasibility and technical options; (2) first-phase prototype, which centers on a demonstration version with one or two major functions; (3) second-phase prototype, which meets additional functional requirements and demonstrates the ability to meet longer term requirements; and (4) full implementation, which includes user training, documentation, and establishment of procedures for maintenance. Overall, within the prototyping process, IC professionals can act as consultants, aiding end users to prototype rather than performing all of the prototyping work themselves.

Training in Use of Corporate Culture to Integrate Interests of IC Professionals and End Users. Because knowledge about corporate culture can be instrumental in helping to integrate the interests of IC professionals and end users, the IC professional should undergo training in this important area. Essentially, the training should center on the essential principles of corporate culture. As a beginning point, there is a need to focus more time and energy on creating the right environment, in which computing results will be produced, and spending less time worrying about the specific activities necessary to produce the results. Employees who are excited about end-user computing have a bigger impact on productivity than factory automation, and a greater impact on revenues than a new advertising campaign. Also, knowledge and certainty are the hallmarks of successful end users. Overall, IC professionals can create a new culture when their actions and decisions are determined by engendering excitement, partnership, risk-taking, and a commitment by all end users to the organization's success. Their greatest reward will be the enduring success of the total organization.

CHAPTER SUMMARY

Essentially, the focus of this chapter was on staffing the information center. A beginning point was relating the organization's corporate culture to the information center. In turn, this knowledge was said to be useful in recruiting the appropriate IC professionals who fit in with the end users' view of computing needs. Among all of the important variables within a

typical information center, services were pinpointed as probably the largest determinant of IC staffing. Services can include teaching, consulting, technical support, planning, evaluation, administration, user help, and measurements, among other activities. Because most ICs concentrate on teaching and consulting, there was a strong recommendation that the information center be staffed by individuals within as well as from outside the MIS department. It was pointed out that external members are important because people in the end-user departments understand the problems and needs of those organizational departments. Such personnel can more quickly assess alternative solutions to those problems based on their experiences. Overall, the foregoing discussion on staffing provided the necessary background for developing Part IV of the IC questionnaire and applying it to the ABC Corporation.

NOTES

1. James Connolly, "Survey Asks: What Makes a Good DPer?," *Computerworld* (January 23, 1984): 15.
2. E. H. Schein, "Management Development As a Process of Influence," *Industrial Management Review* 2, 2 (Spring 1961).

SELECTED REFERENCES

- Abbott, L., "Information Center Staffing: A Distraught Manager's Guide," *Infosystems*, January, 1986
- Ackerman, L. D., "How to Make Corporate Identity Work Harder for the Organization," *Management Review*, January, 1983.
- Atre, S., "Nothing Succeeds Like Access, The Information Center Staff," *Data Training*, January 1984
- Casto, R., "Support for the Support Staff," *Information Center*, April 1986
- Conner, D. R., and G. L. Gery, "A Technology of Change Management," *Information Center*, January 1986
- Connolly, J., "Stress in DP/MIS: A CW Survey," *Computerworld*, November 4, 1985
- _____, "Survey Asks: What Makes a Good DPer?," *Computerworld*, January 23, 1984
- Contino, R., "Unmasking Some Myths about Computer Literacy," *Modern Office Technology*, June 1984
- Crouse, R. L., "Staffing the Information Center," *Information Center*, January 1985
- Dodge, M., "The Working IC Professional," *Information Center*, July 1987
- Ebert, T. H., "The Programmer As Business Professional," *Data Training*, August 1983
- Frantz, D. L., "End-User Demands Add Stress," *Computerworld*, November 4, 1985

- Freedman, D. H., "Changing Jobs," *Infosystems*, April 1984
- Freedman, L., and L. J. Marshall, "Technology for Consulting," *Information Center*, July 1986
- Grover, J. E., "In Search of the Excellent Trainer," *Data Training*, December 1983
- Hagedorn, J. J., "Profiling Corporate Culture," *Today's Office*, October 1984
- Hall-Sheehy, J., "The Perils of an IC Elite," *Information Center*, September 1986
- Hartog, C., and R. A. Rouse, "A Blueprint for the New IS Professional," *Datamation*, October 15, 1987
- Keefe, P., "Dewar's Career Survey Disputes 'Popularly Held' Opinions of DP Professionals," *Computerworld*, January 30, 1984
- Kemske, F., "Information Center Salaries," *Information Center*, August 1987
- Kilmann, R. H., M. J. Saxton, R. Serpa, and Associates, *Gaining Control of the Corporate Culture* (San Francisco, Calif.: Jossey-Bass, Inc., Publishers, 1985)
- Kula, B., "Understanding the DP Professional," *Computerworld*, May 6, 1985
- Linder, J., "Harnessing Corporate Culture," *Computerworld*, September 23, 1985
- Lindholm, E., "Occupation or Vocation?," *Information Center*, July 1987
- Lyons, M. L., "The DP Psyche," *Datamation*, August 15, 1985
- McClain, G. R., "How to Talk to Your Techie," *Information Center*, February 1987
- Pascale, R., "Fitting New Employees into the Company Culture," *Fortune*, May 28, 1984
- Quirk, W. G., "Designing for Novice & Expert," *Computerworld*, October 31, 1983
- Rhein, B., "IC Directors' Problems: Mgmt., Understaffing," *Management Information Systems Week*, August 4, 1986
- Rifkin, G., "All Stressed out and Nowhere to Go," *Computerworld*, November 4, 1985
- Roman, D. R., "Users: The New Corporate Heros," *Computer Decisions*, March 15, 1984
- Schein, E. H., *Organizational Culture and Leadership* (San Francisco, Calif.: Jossey-Bass, Inc., Publishers, 1985)
- Seidman, M., "Coming of Age, The Information Center Grows Up," *Data Training*, January 1984
- Sitton, S., and G. Chmelir, "The Intuitive Computer Programmer," *Datamation*, October 15, 1984
- Stancill, J. M., "Upgrade Your Company's Image—and Valuation," *Harvard Business Review*, January-February 1984
- Stevens, B. A., "Probing the DP Psyche," *Computerworld*, July 21, 1980
- Stix, G., "Breaking out of the DP Mold," *Computer Decisions*, July 2, 1985
- Taylor, L., "Skills in Transition," *Information Center*, March 1986

- _____, "39 Steps to Successful System Development," *Information Center*, February 1985
- Thierauf, R. J., and G. W. Reynolds, *Effective Information Systems Management* (Columbus, Ohio: Charles E. Merrill Publishing Company, 1982)
- Uttal, B., "The Corporate Culture Vultures," *Fortune*, October 17, 1983
- Wallach, E. J., "Decoding Corporate Cultures, Strategies for Career Success," *Data Training*, November 1982
- Weiss, M., "Support Reduces MIS Strain," *Computerworld*, November 4, 1985
- Zawacki, R. A., "How to Pick Eagles," *Datamation*, September 15, 1985
- _____, "Matching People and Positions, Situational Leadership and DP," *Data Training*, December 1983

6

TRAINING OF END USERS USING INFORMATION CENTERS

ISSUES RAISED AND EXPLORED

- To examine various training approaches that can be utilized by the information center.
- To set forth a desirable IC training program for end users.
- To recognize the importance of training in resolving or, at least, reducing computer conflict between IC professionals and end users.
- To set forth Part V of the IC Questionnaire, which evaluates how effective end-user training is.
- To apply this fifth part of the questionnaire to the ABC Corporation to evaluate computer-based training.

OUTLINE

Introduction to Training of End Users Using Information Centers

Effective IC Training of End Users

Guidelines for Selecting Computer-Based Training Software

Approaches to Computer-Based Training

Self-Paced Teaching Materials

Approaches to Delivering Computer-Based Training

Vendor Training

- Consultant Training
- In-House Training
- Continuing Support of Computer-Based Training
- Development of an Effective In-House IC Training Program
 - Identify Specific IC Training Needs of End Users
 - Define the Appropriate Means to Deliver the IC Training
 - Deliver the IC Training
 - Evaluate the IC Training, IC Trainers, and IC Trainees
 - Manage the IC Training Program
- Overview of an Effective In-House IC Training Program
- Continuing Development of IC Training over Time
 - Three-Stage IC Training Development Process
- Part V of IC Questionnaire—Training of End Users
 - Major Sections of IC Questionnaire—Part V
- ABC Corporation—IC Training Development Program
 - Computer-Based Training Problems
 - Evaluation of Computer-Based Training Problems
 - Recommendations to Improve Information Center Training
- Chapter Summary
- Note
- Selected References

INTRODUCTION TO TRAINING OF END USERS USING INFORMATION CENTERS

Many employees see state-of-the-art microcomputers as potentially threatening. Such fears can result in a cold, stiff reception by end users toward the machines, including fear of learning new procedures, fear of becoming trained on unfamiliar equipment, fear of losing status, fear of being replaced by a machine, and fear of being device dependent. These fears, and others, powerfully influence the performance of employees. The result is decreasing productivity. To alleviate these fears, there is a need for some type of training using the information centers. Essentially, this is the main thrust of this chapter.

Initially in this chapter, effective IC training of end users is discussed along with appropriate guidelines for selecting computer-based training (CBT) software. This discussion is followed by an examination of various approaches to computer-based training and ways of delivering it. This background serves a useful purpose inasmuch as the steps in the development of an effective in-house IC training program are enumerated. Continuing development of IC training over time complements this development

process. All of these areas provide a basis for developing Part V of the IC questionnaire which, in turn, is applied to the text's master case study, the ABC Corporation.

EFFECTIVE IC TRAINING OF END USERS

The primary goal of any IC training program is to improve the on-the-job performance of end users. In addition, a sound training program has two very worthwhile side benefits. First, it greatly influences the quality and quantity of end users attracted by the recruiting effort. Potential users carefully evaluate the willingness of the organization to invest in its computer users, and the presence of an effective IC training program provides clear evidence of this. Second, it helps the organization retain experienced end users by enabling them to continue their professional growth, thus meeting their computing needs on the job. An effective IC training program will also help make work more interesting, motivate employees, and cut down on personnel turnover.

Despite the foregoing benefits of a sound IC training program, most information centers tend to approach training in a less than professional manner. The IC training budget is usually determined as some increase or decrease over last year's budget with no relationship to the real training needs of end users. Nor are training results measured in a way to determine their benefits. It is not unusual for information centers to set a training goal, say one week of training per end user per year, but not to include the means to carry out this goal. In a later section of this chapter, a step-by-step approach to the development and management of a sound IC training program is given to show how to avoid these problems of a somewhat haphazard approach. However, before looking at such an approach, it will be helpful to gain a background on computer-based training—appropriate guidelines for selecting computer-based training software, the approaches to computer-based training, and approaches to delivering computer-based training.

GUIDELINES FOR SELECTING COMPUTER-BASED TRAINING SOFTWARE

Before exploring the guidelines for computer-based training, it is useful to look at its importance today. The market for CBT is growing as information centers feel the effects of cutbacks and staff shortages. A recent survey of 1,000 information centers in Fortune 1000 companies—conducted by Crwth Computer Coursewares—indicated that 57 percent of the information centers were currently using some form of CBT; another 25 percent were exploring the possibility.¹ An important factor behind computer-based training, according to respondents, is individualized training because one-on-one training in most information centers is not

economically feasible and because a training staff is not available when needed.

To assist in the selection of computer-based training software, there are a number of guidelines for selecting a high-quality product: (1) the interactive capability of the product, (2) time effectiveness, (3) trainee friendliness, and (4) screen communicative capability. These guidelines, set forth in Figure 6-1, are useful in overcoming the common criticisms of computer-based training.

A common criticism of CBT software is the structure; in other words, the structure of many CBT programs is simply screen after screen of manual-like text. The user is asked to hit the spacebar or return key to continue on to the next page, and, occasionally, multiple choice or fill-in-the-blank questions, requiring the end user to interact with the keyboard, will appear. Clearly, this is not learning by doing; in fact, it is not learning at all. In effect, the user learns how to take the course rather than how to use the application. An effective training package combines instructions with

Figure 6-1
Guidelines for Selecting CBT Software

- *Interactive capability of the product.* Interaction is the essence of good computer-based training. It keeps the user interested, involved, and open to learning. It also makes learning a lot more fun. Products that take the user through screen after screen of text are not interactive, only boring. Each user action should receive a meaningful response. If the user makes a mistake, the program should explain what was wrong and suggest ways to correct it. If the user gets lost or disoriented and cannot figure out what to do, the software should come to the user's aid.
- *Time effectiveness.* Most users are counting on their computers to help them solve problems quickly and to run their business more effectively. They do not have time to waste on learning the structure of a software product's interface. They need to get up and running quickly. Therefore, a training product must be focused on learning applications within a matter of hours and using those applications to perform tasks.
- *Trainee friendliness.* Users want to choose what they learn and when they learn it based on their specific needs. The trainee should be able to leave a lesson, move back in a lesson to review previous sections, skip sections at will and return to the main menu, or quit at any point.
- *Screen communicative capability.* A computer is inherently different from a printed page. What works on paper can be deadening and ineffective on a screen. Ideally, the screen layout should be uncluttered, and it should include graphics, color, and tables of information. Text should be clear, concise, and communicative.

use of the applications. The user can work with the training program and an actual application program simultaneously. This is the essence of the guidelines set forth in Figure 6-1.

APPROACHES TO COMPUTER-BASED TRAINING

When microcomputers began to infiltrate offices in large numbers, picking the right training program was easy: Give the users the manual and wish them luck. It has become a cliché—yet it is also true—that PC software manuals are awful. Despite this fact, the do-it-yourself approach—often using a badly organized, incomplete, and sometimes erroneous manual—remains a common means of IC training for new end users. This approach is changing, however, and both new and accomplished end users stand to benefit from the superior materials now becoming popular in information center training.

Currently, the most common training approaches fall into one of three categories: (1) organized classes, in which a group of people are taught how to use the same hardware or software at the same time; (2) one-on-one tutoring, in which a trainer works with a new computer user, usually in several intensive sessions extending over a week or two; and (3) self-paced training materials, which are specifically produced for each hardware and software product. Few organizations find that one approach serves all purposes. For example, a series of standardized classes on widely used software might be productive and cost effective for nonmanagerial staff members; however, scheduling regular attendance at such classes may be difficult when high-ranking professionals and executives are involved. For them, a flexible series of one-on-one tutorial sessions, run by an IC trainer accustomed to working with managers, might be a better option.

Some users, regardless of their place in the corporate hierarchy, enjoy the challenge of figuring out things for themselves. For them, self-paced training materials may be ideal. This approach accommodates those users who prefer to learn by working alone. It works equally well for people with a hectic, irregular schedule, whose training must be squeezed into odd moments. Self-paced training also allows people who are concerned that their progress may be slower than others' to avoid the embarrassment of a classroom or tutorial setting.

For end users who like to train themselves and for organizations that cannot make a large investment of time or capital via their information centers, good self-teaching materials are available from a number of companies in a variety of formats. Kennen Publishing, Anderson Soft-Teach, and Arthur Young Business Systems, for example, sell VHS- and Beta-format videocassettes which introduce the new user to the micro and several popular software packages.

ATI, Individual Software, Cdex, and others offer floppy-disk-based tutorials. Some are general introductions to micro computing; others are

specifically keyed to popular software packages. Deltak, a long-time supplier of training services in the mainframe world, has moved into PC training as well, with "Teach Yourself" diskettes for individual use, "Video Journals" for management, and extensions of their mainframe computer-based training programs for SAS, FOCUS, and other database systems. In addition, McGraw-Hill has combined several well-known computer-training-program sources, such as CRM, Edutronics, and Tratec, into a new company: McGraw-Hill Training Systems.

The best of these self-teaching programs are excellent. Of course, individual motivation must be high for users to get the most out of these self-directed, self-paced programs; however, in practice, motivation often is very high among new end users. In addition, users find it helpful to repeat complex sections of a program—perhaps several times and at their own speed.

One key to using self-training programs effectively is to provide an environment that is conducive to learning—not working with word processing tutorials while handling phone calls, taking dictation, writing letters, or running errands. It is hard to learn anything new in the midst of a busy office filled with distractions. If end users are to have a realistic chance to learn about a new computer or program, they need quiet, out of the vortex of office routine, to master that tool.

APPROACHES TO DELIVERING COMPUTER-BASED TRAINING

After selecting the type of training needed, IC management must decide how that training will be delivered. Will experienced IC trainers from the outside be hired to organize and run classes? Will selected IC professionals be trained to teach end users? Should instruction take place on or off the organization's premises? Will the training materials used be off-the-shelf purchases from a computer store or a training program supplier, or will customized, in-house materials, keyed to how the organization wants microcomputers used, be developed?

Many organizations bring experienced trainers from outside the organization into corporate classrooms. Consultants are sometimes asked to conduct one-on-one sessions for organization executives; they also may be called in to run special topic courses in such areas as spreadsheets, computer-aided design, and communicating with the corporate mainframe.

Although there are many approaches to information center training, only the three most popular ones are discussed below: vendor training, consultant training, and in-house training.

Vendor Training

Many organizations favor this mode because the cost of training is low. In fact, in most cases, it costs nothing. Unfortunately, "you get what you pay

for" and that is precisely the case with vendor training. With it, there is little support from the vendor. At most, the organization can expect support to be self-paced training packages (in the form of manuals, software tutorials, or videocassettes) presented either in separate classrooms or in an office. This approach has many limitations.

One problem is the lack of instructor support. When end users have a question, they have no one to consult for answers except a manual. Finding answers from a manual can be cumbersome and time consuming. Another problem is that no adequate follow-up is available since no one is directly overseeing the training. Users who finish training via a manual may not have learned operations correctly or may have overlooked certain important steps.

An extensive backlog in training schedules is another substantial problem with vendor training. This can cause delays in receiving the proper training necessary for operating a new machine, which decreases the time to use it to its fullest potential. To compound the aforementioned problems, asking vendors for increased assistance could mean increased costs. Vendors will offer training up to a certain limit; thereafter, they generally charge for the training of additional personnel.

Consultant Training

Like vendor training, consultant training has its own advantages and disadvantages. The principal advantage to consultant training is that managers do not have the organization's resources to instruct end users. Disadvantages exist too—important ones. First, consultant training is costly. Second, once training is over, it is lost forever unless someone has recorded it. If the organization is considering hiring a consultant, it would be helpful to investigate the consultant's reputation and teaching methods.

In-House Training

In-house training typically offers several distinct advantages. First, it is lower in cost than consultant training. Second, it is more reliable than using vendor training. Third, it allows the information center to tailor training to the needs of end users. Fourth, it is instructor intensive and can be adapted to the abilities and needs of each user.

Two seeming disadvantages exist with in-house training. First, it requires shifting some of the organization's resources from production-related activities to achieve training objectives. Second, it is time consuming. Overall, however, the advantages outweigh the disadvantages by a considerable margin, and in-house training of end users via an information center is recommended.

Continuing Support of Computer-Based Training

After the delivery of computer-based training, there is a need to support those who have received IC training of some kind. People not only learn at different rates, they also have different recall abilities. One person might remember 95 percent of what is heard in a class, for instance on the use of dBase III; a second might remember only 50 percent. Two weeks later, knee deep in constructing a database, the second person might need what amounts to a refresher course. The continuing support of newly trained end users is clearly—if not yet widely understood to be—a large part of the training process.

Going beyond the current aspects of supporting computer-based training, there is a need to recognize that as the end-user base grows and matures, its training needs also progress and change. It is, therefore, necessary to plan for and make the appropriate adjustments at the point of need. Also, there is a need to recognize and plan for the higher volume of basic training needs that will develop as the popularity of information center products catches on, and more and more end users want training. As users progress to higher levels of proficiency, they will need more advanced training.

DEVELOPMENT OF AN EFFECTIVE IN-HOUSE IC TRAINING PROGRAM

To develop an effective in-house IC training program using information centers requires a carefully planned and cost justifiable approach to training. One way to obtain such results is outlined below:

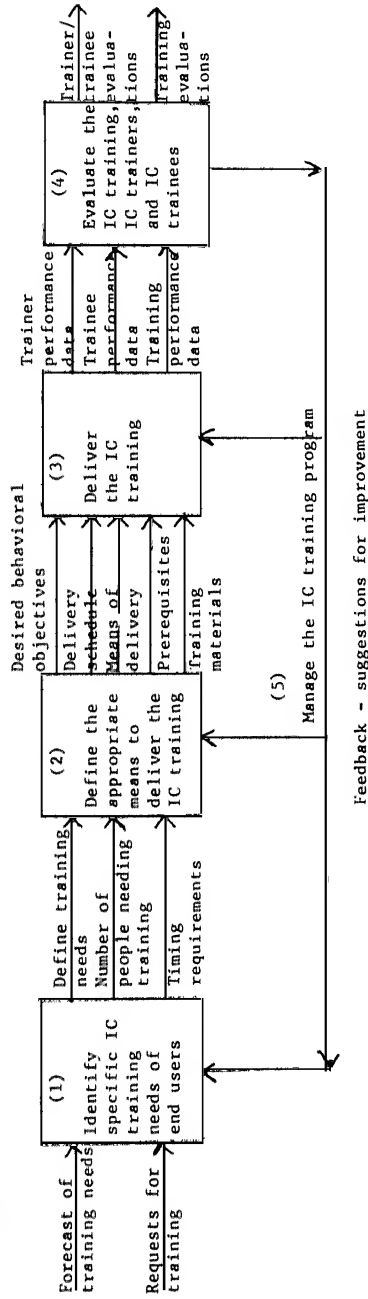
- Identify specific IC training needs of end users
- Define the appropriate means to deliver the IC training
- Deliver the IC training
- Evaluate the IC training, IC trainers, and IC trainees
- Manage the IC training program.

These steps are illustrated as process blocks in Figure 6-2. The inputs necessary to perform each process and the resulting outputs are also shown. These five steps are explained in detail below.

Identify Specific IC Training Needs of End Users

An effective IC training program must be sensitive to the current IC training needs and be able to anticipate future needs. Those responsible for the IC training program must seek out end users to identify their needs. Anticipated hardware and software installations, a change in the relationship of the information centers to end-user departments, or a change in the operations of

Figure 6-2
Steps in the Development of an Effective In-House Training Program Using
Information Centers



the organization may signal a need for training. An analysis of current information center training and an evaluation of the reasons for their success or failure provides another perspective on training needs. Further, needs can be evaluated by paying attention to the user requests for training.

These perceived needs must then be carefully evaluated to decide if the need really can or should be met. Will delivery of the desired training lead to an improved performance of end users that is consistent with the goals and long-range direction of the organization? Is the importance of meeting the need sufficient to justify management attention and the required IC training effort? Can the need be fulfilled through IC training?

The output of this first step consists of defined end-user training needs, an estimate of the number of end users needing the training, and a rough schedule of when and how often the training should be offered. The basic training needs description provides an overview of training and its purpose. The estimate of the number of users who need the training should carefully consider future employment and recruiting plans because of the heavy participation of new users in training.

Define the Appropriate Means to Deliver the IC Training

The second step is to consider the defined IC training need, the estimate of end users needing the training, and timing requirements and, in turn, to define the appropriate means to deliver the training. One way to define clearly the means is to specify the following items: (1) behavioral objectives, (2) delivery schedule, (3) means of delivery, (4) screening process for potential trainees, and (5) training materials.

Behavioral Objectives. The use of behavioral objectives is one way to apply the management-by-objectives (MBO) philosophy to training. Behavioral objectives describe a measurable behavior that the IC trainee will be expected to perform upon successful completion of the training. A set of clearly stated behavioral objectives will direct the study efforts of the IC trainee and help the IC trainer to define the specific training to be delivered.

Delivery Schedule. The delivery schedule defines when and how frequently training will be offered. The schedule should be based on the real needs of the organization—how many end users require the training to improve their effectiveness and when they must have it. Scheduling training facilities, obtaining qualified instructors, and all other training details must be managed to meet these needs.

Means of Delivery. There are two primary ways in which to deliver the IC training to improve on-the-job performance: through on-the-job experience using the information center or through formal courses, delivered by either IC professionals or outside trainers.

Screening Process for Potential IC Trainees. An effective IC training program must have a screening process to ensure that the participants are

enrolled in the appropriate training programs. Prerequisites for the programs should be defined. Potential trainees and their managers should be encouraged to make a careful and deliberate decision on participation in any IC training.

Training Materials. A list of all training materials needed by both the trainees and the instructors must be developed, and the materials must be obtained. Training materials commonly include software, texts, case study notebooks, workbooks, audiovisual films and equipment, and computer-related equipment for hands-on experience.

Deliver the IC Training

IC training is most successful when it is presented in a well-organized manner and with rigor. All trainees must receive the appropriate training materials in advance and complete any necessary paperwork. The behavioral objectives for each portion of the IC training must be highlighted before, during, and after training. A clear connection must be made between major topics in the training and real, job-connected activities of the trainees. Quizzes, preferably using the software packages being studied, should be designed to reinforce learning, provide trainees with feedback on their understanding of what has been taught, and evaluate the trainee's progress.

The delivery must be carefully planned to maintain a high degree of trainee interest. A high level of interest will motivate the trainees and greatly improve their ability to meet the behavioral objectives of the course. Software packages, case studies, and audiovisual materials are excellent means of keeping the interest level high and reinforcing the training. Careful selection of the IC trainer also can help to ensure a high degree of interest. The trainer must be capable of taking a responsible position toward improving organizational and individual performance, have a solid background in the subject, possess a high degree of instructional talent, and empathize with trainees.

Evaluate the IC Training, IC Trainers, and IC Trainees

Upon completion of the IC training, the IC trainees should be evaluated to determine whether they can now meet the behavioral objectives of the course. This evaluation could be performed by having the trainees take a written test or pass an oral exam given by their IC trainer, or by closely observing their on-the-job performance using the appropriate software package. The trainees must be given feedback on their degree of success in meeting the behavioral objectives. If the trainee has not met some behavioral objectives and if this failure lowers on-the-job performance, the trainee and the trainer must work together to eliminate this weakness.

Additionally, IC trainees should be encouraged to fill out training/trainer evaluation sheets for use by the trainer and the IC manager.

Trainees can thus provide feedback valuable for improving the next training session.

Manage the IC Training Program

Management of the IC training program should be handled similarly to any other system project. The IC manager should be responsible for the management of the IC training program. This manager must clearly define objectives for the program, analyze the costs and benefits associated with it, and obtain approval to meet these objectives from corporate management. An attempt to quantify the benefits of a sound IC training program in terms of improved on-the-job performance, an enhanced recruiting effort, and reduced turnover of experienced end users is suggested.

It will be necessary to prepare a timetable and a budget for each major phase of the total IC program. The IC manager must periodically review and report progress relative to these milestones and take appropriate corrective actions if progress deviates too widely from the plan. He or she must obtain the resources necessary to meet the objectives—training facilities, equipment, materials, and trainers, as well as regular feedback. This information can then be used by the training manager to identify and justify appropriate changes to the IC training program.

Overview of an Effective In-House IC Training Program

An effective in-house training program requires a genuine commitment to understanding end-user needs, which can be perceived by the end users. Speaking without technical jargon and listening well go hand in hand with knowing technical solutions to problems. The goals are user self-sufficiency and enhanced productivity. This means, among other things, increasing user comfort and confidence by demystifying technology.

Essentially, the preceding steps have centered on the following. First, there is a need to identify the specific IC training needs of end users. Then, appropriate training methods must be defined along with the means for delivering the IC training. Either commercially available training packages or custom-designed courseware can be used. Effective training also includes evaluation of progress and recommendation of further IC training based on individual progress measurements. The IC professionals responsible for administering the entire IC curriculum must evaluate, select, and, if necessary, modify training programs on an ongoing basis. In addition, the IC professionals must know not only current user needs, but emerging needs as well.

CONTINUING DEVELOPMENT OF IC TRAINING OVER TIME

Because the typical information center must be concerned with the emerging needs of end users, there is a need for IC management to consider

how its training role can be expanded over time. Essentially, IC management must consider a three-stage training development process which is linked to the growth of its information centers. This process is described below. It is assumed that the success or failure of many information centers is linked to their ability (or lack thereof) to anticipate and meet the training needs of end users. A comprehensive training program to assist end users over time can be one of the most effective tactics available to ward off potential problems, particularly computer conflict ones, and stack the odds in favor of end-user success.

Three-Stage IC Training Development Process

As noted in the steps elaborated previously, the major activity of the information center educators is to provide appropriate training classes for end users. However, as the level of exposure to computers in the general population increases, the need for this type of training diminishes. End users who have had some training with computers as part of their formal education or in previous job assignments will become more commonplace. Eventually, the demand for product training stabilizes, yet the IC program will remain the foundation for basic product know-how. There will always be a steady stream of end users who want to fill the gaps in their knowledge of information center tools.

Implementation of the first stage of the IC training development process—*product integration*—begins as soon as most end users have reached their initial goal. End users see the result of using information center tools and begin asking their subordinates to take on a wider variety of tasks. They also note that paper, pencils, and calculators still seem to be the major tools of their subordinates, in spite of all the product training. Managers are often puzzled and frustrated by their subordinates' apparent inability to transfer their newly acquired skills to all the tasks they perform. They feel that there must be a way to put it all together, but neither they nor their subordinates can devise the complete solution. If the information center has successfully met the users' needs in the past, end users will often return for additional assistance.

Additional assistance can take several forms. At one level are the end users who must combine, consolidate, or share information across products. At another level are the managers who need to develop an understanding of automated systems. Generally, the end-user needs are easier to satisfy, and they take the form of advanced training that focuses on data sharing and acquisition. It is also at this point that users begin to explore the possibilities of accessing data across hardware boundaries. Something akin to a micro-mainframe link or a production-to-time-sharing circuit can become the bridge end users are seeking to link various islands of data together. Thus, this first stage begins to reflect the more comprehensive needs of the end users by offering advanced, technically specialized courses which address data sharing fundamentals.

Stage two—*systems integration*—begins when end users conceptualize beyond product integration and begin to consider the need for linking systems. The demand for shared corporate databases with access from virtually any workstation signifies the need for this second stage. Preparing end users for the “automated office,” as it is sometimes called, includes all of the skills and concepts taught in the previous stage with the added concerns of systems compatibility and data integrity. The distinction between microcomputers and time-sharing applications is no longer a major concern as end-user managers ask their staffs to look for the interrelationship among their systems and to derive meaning from those relationships regardless of their origin. The problems users typically face at this stage are data compatibility, integrity, documentation, and access.

As a solution, this stage stresses standardization techniques, documentation standards, data verification, and overall system controls. These are the same concerns routinely encountered by any MIS department. The major difference is that the knowledge is being shared with end users who are not part of the MIS professional staff. The difference in audience is significant, and the educational strategies must reflect the difference. Therefore, borrowing the training materials from the MIS area may not as useful as it seems and may, in fact, produce contrary results. Thus, the major task of the IC professional in this stage becomes one of a “translator” who speaks in the dialect of the end user to explain proven systems methodology. The professional MIS courses tend to be replete with jargon, technical language, obscure examples, and information unnecessary to end users, which they have neither the time nor the desire to learn. If the typical MIS courses are used, end users have a tendency to concentrate on the technical details and lose sight of the overall system perspective—exactly the wrong effort at this point. Acquiring the appropriate materials for presentation is often the major challenge. Unlike the abundance of courses available to MIS professionals, few systems design courses have been developed exclusively for end users. The IC professionals must either spend a significant amount of time attempting to locate the information that is needed or spend even more time rewriting the MIS training manuals.

In stage three of the IC training development process, there is a need to *upgrade the skills and capabilities of IC professionals* to carry out the previous two stages. The essential message is that IC management should not let their staff become so busy chopping down trees that they do not take the time to sharpen their axes. They should progress and mature, just as end users do. Providing the technical, business, and management training needed is an important priority of IC management.

Initially, IC management should provide business training to educate the IC professionals in how the organization operates, including the “big picture.” There is a need to train IC professionals in interpersonal relations, in communicating bad news, in managing expectations, and so on. In addition, assertiveness training should better equip them to involve themselves

in their users' business and decision-making processes. It will help them to say "no" to time wasters. Overall, IC management needs to provide the appropriate level of training to ensure that IC professionals have the proper skill levels.

In summary, the goal of this three-stage IC training development process that should be achieved over time is to reach a point of end-user self-sufficiency. Self-sufficiency does not mean the eventual elimination of all end-user questions. What it does mean is providing end users with the tools, skills, and understanding to develop solutions to their problems. This is accomplished by providing end users with hardware, software, and technical product knowledge and by providing end-user managers with a corporate systems perspective. Essentially, the typical information center has evolved from a conceptual model to a functional corporate entity charged with delivering automated solutions to a variety of business needs. Likewise, the focus of the center has broadened from increasing the productivity of end users to increasing the productivity of the entire organization.

PART V OF IC QUESTIONNAIRE—TRAINING OF END USERS

In the short run to the long run, a considerable amount of time, energy, and money is spent to establish and maintain an in-house IC training program for end users. Such an investment will increase their productivity. In turn, end users will impart some of their training to future subordinates. In addition, once the IC training program is established and the "bugs" have been removed, the in-house IC training program will more than pay for itself over time. Part V of the IC questionnaire centers on an evaluation of whether the investment is paying for itself. The managing delivery aspects of the in-house IC training program are evaluated, and the staffing and evaluating aspects are analyzed by means of a series of very pointed questions.

Underlying many of these questions in Part V is the fact that IC training should concentrate on those areas that have a high success potential. Essentially, end users should be trained to solve problems that will prove fruitful—do not apply the machines to problems that are immensely complex and have a high possibility of failure. If microcomputers can handle certain applications well, train end users to accept and use such machines.

Major Sections of IC Questionnaire—Part V

The major sections of the training of end users are as follows:

- Section A. Overall IC Training Considerations
- Section B. Managing In-House IC Training Programs
- Section C. Delivering In-House IC Training Programs
- Section D. Staffing In-House IC Training Programs
- Section E. Evaluating In-House IC Training Programs.

Figure 6-3 gives these sections of Part V. Just as in previous chapters, these questions are useful in evaluating how effective the organization's information centers are. In this case, the focus is on training. This part of the IC questionnaire is also used to evaluate the master case study in the next section.

Figure 6-3

Part V of the IC Questionnaire—Training of End Users

	<u>Yes</u>	<u>No</u>	<u>N.A.</u>
Section A. Overall IC Training Considerations:			
1. Has IC management reviewed the various approaches to training to find the appropriate one(s)?	_____	_____	_____
2. Does IC management recognize the importance of distinguishing between hardware training and software training?	_____	_____	_____
3. Does the information center provide in-house training when a cost/benefit analysis justifies it?	_____	_____	_____
4. Does the information center provide vendor training when a cost/benefit analysis justifies it?	_____	_____	_____
5. Does the information center consider outside consultants when a cost/benefit analysis justifies it?	_____	_____	_____
6. Are the in-house training programs reviewed periodically for relevance to the times?	_____	_____	_____
Section B. Managing In-House IC Training Programs:			
1. Are the in-house IC training programs under the direction of a capable in-house training director?	_____	_____	_____
2. Are the in-house IC training programs directed toward meeting the needs of end users versus those needs desired by the IC training staff?	_____	_____	_____
3. Do the in-house IC training programs follow a set method of development, that is, are there specific steps for the IC trainer to follow in their development?	_____	_____	_____
4. Do the in-house IC training programs allow for evaluation of the training after it has been delivered?	_____	_____	_____
5. Do the in-house IC training programs try to reduce the computer conflict between IC professionals and end users?	_____	_____	_____
6. Are the in-house IC training programs reviewed by an independent third party for appropriateness to the organization and the times?	_____	_____	_____

Figure 6-3 (Continued)

	Yes	No	N.A.
Section C. Delivering In-House IC Training Programs:			
1. Are the in-house IC training programs delivered in a timely manner, that is, are appropriate user training needs offered at the proper time?	_____	_____	_____
2. Are the in-house IC training programs delivered at the proper place to be meaningful to end users?	_____	_____	_____
3. Are the in-house IC training programs geared for managers at the higher levels or, at least, their staffs to improve organizational decision making?	_____	_____	_____
4. Does the in-house IC training provide a means to improve the productivity of management?	_____	_____	_____
5. Does the in-house IC training provide a means to improve the productivity of operations personnel?	_____	_____	_____
Section D. Staffing In-House IC Training Programs:			
1. Does the IC training staff have the proper academic credentials to give the appropriate end-user training, that is, do end users perceive the trainers as qualified?	_____	_____	_____
2. Does the IC training staff have the proper real world experience to give the appropriate end-user training and is it perceived by the end users as such?	_____	_____	_____
3. Is the IC training staff experienced enough to sense the problems of end users when the training is being delivered, that is, the training is too fast or too slow, too difficult or too easy, etc.?	_____	_____	_____
4. Is the IC training staff geared to teaching new materials resulting from changing computer technology?	_____	_____	_____
Section E. Evaluating In-House IC Training Programs:			
1. Are the in-house IC training programs evaluated periodically to ensure that they are relevant to the times?	_____	_____	_____
2. Is the IC training itself evaluated to ensure that it meets end-user needs?	_____	_____	_____
3. Are the IC trainers evaluated by end users to provide feedback on the effectiveness of the training?	_____	_____	_____
4. Are the end users consulted about the instruments used in evaluating			
a. The IC training?	_____	_____	_____
b. The IC trainers?	_____	_____	_____
c. The IC trainees?	_____	_____	_____
5. Is the IC training evaluated in terms of resolving or, at least, reducing computer conflict?	_____	_____	_____

ABC CORPORATION—IC TRAINING DEVELOPMENT PROGRAM

Before looking at the training situation, it would be advisable to review the present state of staffing in the five information centers of the ABC Corporation. A past and recurring problem is the fact that the information centers were started when the resources of the MIS department were already stretched to meet current computer projects. The allocation of MIS professionals to the new centers has increased the lateness of the computer projects during the past two years. In fact, some of the better MIS professionals have asked to be transferred to one of the information centers to get out of a "pressure cooker" atmosphere. Staffing, then, has become more critical within the MIS department, and it is expected to remain that way for some time. Also, training of MIS professionals has become a problem because of the shortage of MIS professionals as well as the time demands of senior MIS professionals who are the most qualified to offer the training.

To assist in knowing what activities were being undertaken by the five information centers, a log of contacts with end users, which includes a brief description of the meeting and any actions taken, is maintained. Although the information center staff is free to handle users' problems directly if the solution is clearly suitable for end-user computing, all contacts are logged, and the appropriate person on the applications development staff of the MIS department is notified if a problem could best be solved by an MIS professional. The log is distributed monthly to the applications development group and to other interested parties so that they can follow up on any activities deemed appropriate. Due to the strained resources of the MIS department, the MIS department is unable to follow through on these leads, resulting in a high level of frustration for MIS management and end users and an inability of MIS management to meet established goals and objectives for the information centers. Knowing what should be accomplished and what is being accomplished can cause a high level of anxiety for MIS management.

Computer-Based Training Problems

A number of end users are reluctant to get involved in computer-based training for several reasons other than the foregoing and others. Essentially, their reasons for resisting automation and training in the newer processing modes fall into the following general categories:

- *Feelings of self-devaluation and inadequacy.* There is often an implication that if automation is necessary, then prior performance was not adequate. Also, end users fear that they will be unable to learn the new technology and are afraid that their skills will become obsolete and that they will lose influence within their departments.

- *Fear of economic loss.* End users fear the loss of job security and their financial stability.
- *Being uninformed about the technology.* Much of the end-user opposition stems from not knowing the reasons why the systems have been installed, not from being dissatisfied with the way in which things are currently done. Users are concerned about what the specific changes will mean to them personally. Too often, employees find out about the automation second hand.
- *Unsettling changes in work patterns/relationships.* End users often express fear that their satisfying peer relationships will be broken up or that their relationship with their supervisors or subordinates will change. They envision that the content of their jobs and the way in which their tasks are conducted will be unrecognizable once the workstation is introduced.
- *Inadequate rewards/resources.* End users are concerned that automation will require too much effort, pressure, and responsibility and that it will have to be accomplished with the same or fewer resources and with no hope of personal rewards.

Because end users are reluctant to discuss their fears and concerns about automation, typically, they do not want to get involved in computer-based training. Ironically, this is the best way to overcome their negative feelings toward further automation of the work place. As noted in the previous discussion in the chapter, computer-based training is an efficient way of training and an enjoyable one because of interactivity. Computer-based training avoids the monotony associated with the mechanics of a lecture course. Within this type of training, faster students can progress more quickly while slower ones can go back and restudy certain materials. This is an excellent tool also for the student who wants to refresh himself or herself in a particular area. Computer-based training is available and it is friendly.

Evaluation of Computer-Based Training Problems

Utilizing the above comments about computer-based training and materials in the previous chapters, we are now in a position to employ Part V of the IC questionnaire (refer to Figure 6-3). The negative answers found in Figure 6-4 will assist in understanding the true training problems of the five information centers. In Section A, Overall IC Training Considerations, only the last question (question 6) was answered negatively. Although in-house IC training programs are reviewed periodically, end users perceive the training is too fundamental and is not particularly relevant to solving their specific problems. Due to the diversity of end-users' needs, the capacity of computer-based training to meet specific user needs is beyond the reach of the IC professionals who lead the training sessions.

Related to the foregoing comments are those for Section B, Managing In-House IC Training Programs, in which questions 2 and 5 were answered negatively. Fundamentally, current in-house IC training programs are perceived as being oriented toward what the IC training staff thinks is

Figure 6-4

Explanations for the "No" Answers in Part V of the IC Questionnaire—Training of End Users (see Figure 6-3)

Section A. Overall IC Training Considerations:

- A.6. Although computer-based training is reviewed periodically for relevance to the times, end users feel that the present computer-based training is too fundamental and is not geared to solving their specific problems.

Section B. Managing In-House IC Training Programs:

- B.2. In-house IC training programs are perceived as being oriented toward what the IC training staff thinks is needed versus what end users feel they need.
- B.5. Essentially, the in-house IC training programs do not reduce the level of computer conflict between the IC professionals and the end users because of a difference of opinion about perceived end-user needs versus actual user needs.

Section C. Delivering In-House IC Training Programs:

- C.4. Because the in-house IC training programs are perceived as being so basic, productivity of management is not greatly affected by the training efforts of the IC staff.
- C.5. Same as for C.4.

Section D. Staffing In-House IC Training Programs:

- D.2. A basic contention of end users is that the IC training staff lacks the real world exposure that is necessary to pinpoint those areas of training that are extremely helpful to end users.

Section E. Evaluating In-House IC Training Programs:

- E.2. Although IC training is evaluated, end users feel that their evaluations are ignored and not used by IC management.
- E.5. End users feel that computer conflict is increased because of the poor handling of the IC training evaluations.

needed versus what end users really feel they need. In effect, the perceived needs of end users are not what are needed. End users need more personalized training to assist them in solving their specific problems on the job. Currently, the five information centers do not meet end-user actual day-by-day needs. These comments are also related to Section C, Delivering In-House IC Training Programs. In terms of negative answers to questions 4 and 5, neither management nor operating personnel see the present training as a means of improving their productivity on the job.

In Section D, Staffing In-House IC Training Programs, the first question, which was answered affirmatively, indicates that the IC training staff is

academically qualified; however, the negative response to question 2 indicates that end users perceive that these IC professionals lack real-world experience that could be helpful to them in getting the most out of their training. Typically, the IC training staff fails to practice the old saying: "If a picture is worth a thousand words, an example is worth ten thousand words." Finally, in Section E, Evaluating In-House IC Training Programs, the IC training programs are evaluated periodically; however, as noted by the negative response to question 2, end users feel that the evaluation process does not help them because the negative responses to in-house IC training programs are by and large ignored by IC management. Also, a negative answer to question 5 indicates that the improper handling of the IC training evaluations has led to increased computer conflict between IC professionals and end users.

Recommendations to Improve Information Center Training

As stated in the previous comments, end users are not happy with the in-house IC training, and they do not feel comfortable when taking CBT courses. Needless to say, IC trainers need to rethink their approaches to training. They need to go beyond the fundamentals of micro hardware and software. IC trainers need to show end users how the newer approaches to automation will help them. If the end users feel that they will benefit from the micro systems approach, they will be more receptive toward it. A balanced picture of what the systems can and cannot do must be incorporated into IC training for end users. Additionally, there is a need to prepare end users before their micros arrive in order to build their confidence. Due to the importance of microcomputer training for end users, appropriate recommendations are covered below. Other recommendations, which can be stated in the form of guidelines for corporate management, IC professionals, and end users, will be found in Chapters 8, 9, and 10, respectively.

Training of Microcomputer End Users. For the ABC Corporation (or for any other organization), the nature of the average microcomputer task involves a relatively small amount of data and a short duration of processing. At the same time, these tasks are often highly visible, consisting of analyses and reviews for managers and operating personnel. From an IC resource viewpoint, the jobs are trivial; from a user's viewpoint, they are not at all trivial. In view of these differences, the type of training needed for end users versus MIS professionals is completely different. Hence, the traditional training programs offered by the five information centers (such as getting started on a microcomputer and making use of Lotus 1-2-3 and newer programming languages) must take newer directions. Two of these are discussed below.

First, it is recommended that end users develop their own microcomputer skills further as well as share their solutions to common problems.

This is especially evident among the financial and accounting departments at corporate headquarters and throughout the plants. In the first days of using a financial planning language, financial applications were developed for the users by the staff of the information centers. Over time, the end users have taken increasing responsibility for designing sophisticated models. Today, several end users in the corporation can create models equal to or better than those of the IC professionals.

Second, it is recommended that the increasing number of end users to be trained in the future be met by using microcomputer training program packages. Although training end users may be more of an art than a science, a well-designed software instructional program can help. Well designed means a course that avoids intimidating the learner, yet provides enough practical knowledge to perform meaningful tasks upon completion of the program. Improved training software will help alleviate many of the questions that were answered negatively in Part V of the IC questionnaire.

The following guidelines for the staff of the information centers in evaluating software for microcomputer training are offered. If an instructional software package is to be used, it must

- Be easy to use
- Include extremely clear directions, without any vague terms that might confuse the neophyte
- Allow the user to interact immediately with the information on the screen
- Give the learner a position of control at all times so that the person can choose what to pursue
- Have appealing screens, with clean, clear-cut graphics
- Be free of "bugs" so that there are no errors in the program
- Include a variety of examples that demonstrate the points clearly to the user
- Include ample practice opportunities with immediate feedback.

If the user misses a question, he or she needs to know why. The program should not only explain why, but also should offer a remedial pathway. With these standards in mind, it should be relatively easy to separate the useful from the useless in microcomputer training program packages.

CHAPTER SUMMARY

For the most part, this chapter built upon the previous one, in which the focus was on staffing the information center with IC professionals who possess business knowledge, communication skills, and corporate diplomacy along with the "nuts-and-bolts" technical know-how. With these credentials, IC professionals have the proper background to train end users in the practice of micro hardware and software. The net result of effective IC training should be increased end-user productivity and improved performance of the organization's units.

To accomplish these important goals, the chapter looked at various approaches to computer-based training along with appropriate guidelines and the various ways of delivering it. This background served as a basis for developing an effective in-house IC training program to meet end-user needs. Also, continuing developments of IC training over time were discussed. Finally, Part V of the IC questionnaire was set forth, and it was applied to the ABC Corporation.

NOTE

1. Stan Kolodziej, "Searching for the Right Product," *Computerworld Focus* (October 8, 1986): 44.

SELECTED REFERENCES

- Ashmore, K., "The Proteam Trainer, Meeting the Needs of the Information Center," *Data Training*, August 1985
- Austin, S., "Mixed Grades for Training Software," *Business Computer Systems*, June 1985
- Becker, S., "Why a Consultant? When and How to Use Outsiders," *Data Training*, February 1984
- Brink, L., "Build or Buy? Managers Must Weigh CBT Tool Options," *Computerworld*, May 5, 1986
- Brown, G. D., "The Hot Medium," *Information Center*, August 1985
- Casto, R., "Establishing IC Outputs," *Information Center*, June 1985
- , "Planning, Prospects and Client Support," *Information Center*, December 1985
- Efroymson, S., "Managing End-User Training," *Computerworld*, May 5, 1986
- Efroymson, S., and D. B. Phillips, "Here a Course, There a Course," *Information Center*, September 1985
- Eibes, M., "Two More Steps in User Education," *Information Center*, February 1986
- Esparza, M. S., "Personalizing CBT," *Infosystems*, January 1987
- Fiderio, J., "Humor, Interactivity Enhance CBT Training," *Computerworld*, May 5, 1986
- Freedman, L., and L. Marshall, "Learning to Speak End-User Painlessly," *Information Center*, March 1986
- Garcia, E., "Talent from Within, In-House Computer Training," *Data Training*, February 1984
- Gewirtz, M., "Learning on Their Own," *Information Center*, September 1987
- Hall-Sheehy, J., "Back to Basics," *Information Center*, November 1986
- , "When Bad Things Happen to Good Trainees," *Information Center*, July 1986
- Handler, B. H., "On-Line CBT Evaluation," *Data Training*, August 1987
- Ives, W., "CBT and the Cognitive Process," *Data Training*, October 1987
- Kemske, F., "Computer-Based Training, at Its Best and Its Worst," *Software News*, January 1984
- , "Risk and Responsibility in End-User Training," *Data Training*, September 1987

- _____, "A Guide to Computer-Based Training Systems," *Software News*, January 1985
- Kliem, R. L., "In-House Training for Microcomputer Users," *Administrative Management*, December 1985
- Lindholm, E., "Sending Users to Camp," *Information Center*, November 1986
- Lipton, R., "The New Age of End-User Programming," *Business Computer Systems*, January 1985
- McArdle, J., "What to Do after Choosing a Data Processing Consultant," *The Office*, June 1984
- McClain, G., "The Overloaded Trainee, Putting Concepts into Context," *Data Training*, August 1985
- Michtom, J., "Does Your IC Measure Up?" *Information Center*, August 1985
- Mills, B. F., "Controlling the PC Training Monster," *Data Training*, September 1987
- Nachshen, B., "Training for Customer Support," *Data Training*, August 1987
- _____, "The Value of Training in Dollars and Cents," *Computerworld*, April 6, 1987
- Neikrug, E., "Struggling for Harmony in Writing Applications," *Computerworld*, June 30, 1986
- Quick, T., "Trainers Deserve Leadership Role," *Computerworld*, May 5, 1986
- Richardson, M. J., "13 Steps to Computer Literacy, Training End Users," *Data Training*, January 1984
- Rifkin, D., "Training for MIS," *Computerworld*, July 28, 1986
- Rogers, J. L., "Computer-Based Training Moves within Reach," *Information Center*, September 1985
- Roman, D., "Behind the Slump: Poor Training," *Computer Decisions*, November 5, 1985
- _____, "Computer-Based Training, Tutorials Well Taught," *Computer Decisions*, July 30, 1985
- _____, "Training via Satellite," *Computer Decisions*, December 3, 1985
- Russell, M. L., "The Business of Training," *Data Training*, November 1987
- Saunders, L., "The Professional Approach to Training," *The DEC Professional*, March 1985
- Selund, B., "The End User As Developer, Authoring On-Line Inquiry Systems," *Data Training*, August 1985
- Seymour, J., "How to Choose a PC-Training Program," *Today's Office*, February 1985
- Slaughter, G., and J. F. Slaughter, "The Back-to-School Training Blues," *Computerworld*, October 7, 1985
- Snyder, C., "How CBT Makes Better Employees," *Business Software Review*, October 1987
- Stahlheber, S. A., "The Machine As Trainer," *Information Center*, January 1985
- Stevens, L., "Every User a Programmer," *Computer Decisions*, August 26, 1986
- Stokes, S. L., Jr., "Fighting over Turf, Ways of Looking at Management Training," *Data Training*, August 1985
- Taylor, L., "39 Questions to Successful System Development," *Information Center*, February 1985
- Young, T. R., "The Lonely Micro," *Datamation*, April 1, 1984

Part IV

Control over Effective Information Centers

7

CONTROL AND SECURITY OVER INFORMATION CENTERS

ISSUES RAISED AND EXPLORED

- To demonstrate the need for linkage of IC plans and organization to IC control and related security.
- To discuss the important control and security problems experienced by information centers and how to overcome them.
- To examine the justification for a typical information center currently.
- To set forth Part VI, the final part of the IC questionnaire, which is useful in evaluating control and related security over the information center.
- To apply this sixth part of the questionnaire to the ABC Corporation to examine the degree of control over its information centers.

OUTLINE

Introduction to Control and Security over Effective Information Centers
Linkage of Desired IC Plans and IC Organization with Control
Traditional MIS Control Approach to Data Security and Data Integrity
Current IC Control Approach to Data Security and Data Integrity
 Problems with the Current Control Approach
 Procedures to Overcome Current Control Problems
Importance of IC Education to Improve Control
 IC Management Guidelines to Improve Control
Justifying Existence of Information Centers
 Charge-back System Approach

- Active Supporter Approach
- Part VI of IC Questionnaire—Control and Security over Information Centers
- Major Sections of IC Questionnaire—Part VI
- ABC Corporation—Control and Security over Information Centers and Microcomputers
- Control Problems over Information Centers and Microcomputers
- Evaluation of Control Problems over Information Centers and Microcomputers
- Recommendations to Improve Control over Information Centers and Microcomputers
- Chapter Summary
- Selected References

INTRODUCTION TO CONTROL AND SECURITY OVER EFFECTIVE INFORMATION CENTERS

As discussed previously in this book, MIS professionals have viewed microcomputers as one might view an unwelcome house guest. They feared that microcomputers might have threatened the MIS department with loss of control, loss of security, and corruption of data integrity. What could they do to resolve the problems if the organization became a "Tower of Babel" with from ten to fifteen types of small end-user systems unable to talk to one another? Fortunately, this fear has lessened as more and more information centers have established acquisition policies for microcomputers to control the situation. Information centers now see micros as part of their turf. It is from this standpoint that control and security over microcomputers are presented in this chapter.

To open the chapter, the linkage of previous chapters to the present one is discussed, that is, IC plans and IC organization structures are related to control over information centers and end-user operations. Next, the traditional MIS control approach to data security and data integrity is set forth, followed by the current IC control approach. The discussion of the problems with the current control approach provides the background for offering procedures in how to overcome them. Not only is the importance of IC education stressed to improve control, but also appropriate control guidelines for IC management to follow are given. This information plus the justification of the existence of information centers is useful in developing Part VI, the final part, of the IC questionnaire. As in previous chapters, this part of the questionnaire is applied to the ABC Corporation.

LINKAGE OF DESIRED IC PLANS AND IC ORGANIZATION WITH CONTROL

With the proliferation of microcomputers throughout a typical organization today, there is a "dark side" to this computer revolution. Such

obvious problems as potential fraud have received a lot of publicity; however, there are more subtle problems which are only now beginning to receive their share of attention. The computer allows the user to make errors with more confidence. Hence, there is a need to change the GIGO principle from "garbage-in, garbage-out" to "garbage-in, gospel-out." With the assistance of information centers, microcomputer users can pick and choose from many figures and information in their personal databases. They can enter their own data and keep the data on their own floppies, and *no one* can guarantee the accuracy or pertinence of the data to the corporate scheme. On the other hand, the one thing that the organization should care about is the accuracy of the data from which business decisions derive. It is on such data that the company bases its business, not on pieces of data here that differ from pieces of data there. This, of course, underscores the role of information centers in organizations; they are the caretakers of these widely dispersed databases.

The next step is the eventual connection of PCs with other office automation equipment through local area or private branch exchange networks linked to host computers. Typically, this approach will soon cause major changes in the way microcomputers are purchased in major organizations, which is in sharp contrast to the recent practice of end users buying their own micros and applications software with departmental funds. Information centers will have better control over these purchases as well as purchases of other types of office automation equipment. Information centers will be motivated by the need to ensure tight control over databases, the need to ensure compatibility among the various types of equipment, and also, in part, the desire to obtain sizeable discounts through large volume purchases.

In view of the foregoing concerns about better control over microcomputers used by end users, there is even a greater need to link important control factors with microcomputer IC plans and IC organization structures. That is, when appropriate information center plans along with its organization structures are developed for the forthcoming year, there is a need to establish an appropriate control mechanism to ensure that what was planned has been accomplished. The basic control mechanism is the information center annual budget which is broken down on a monthly basis for comparison to actual expenditures. In this manner, financial results can be compared to the original plan to determine the proper accomplishment of stated IC goals. (This subject is covered in Chapter 2.) Going beyond this basic control approach are other control mechanisms which center on security over end-user computing and control over day-by-day operations. Due to their importance, these approaches are covered below in terms of their problems, and ways of overcoming the problems are given.

TRADITIONAL MIS CONTROL APPROACH TO DATA SECURITY AND DATA INTEGRITY

Before investigating current control and security problems related to information centers, it would be advisable to look at data control as found in MIS operations. Typically, data control involves *data security* and *data integrity*. Data security is the securing, or protection, of data against theft or malicious manipulation, including the protection of the stored data and the physical protection of the computer involvement. In contrast, data integrity, i.e., the controls applied to the data during the input, processing, and output phases, involves ensuring that the input data are accurate and complete. Data integrity also involves ensuring that the data are processed correctly and that the data do not become distorted or lost through system mistakes.

Processing controls are established through the actual software to determine whether data have been lost, or if invalid data have been entered. There are such programming checks as record counts, range and limit checks, and sequence checks. The amount of processing controls that can be established is limited only by the cost trade-offs. Output controls are final checks that establish the accuracy and ownership of the processed data. It should be noted, however, that all data integrity controls must have procedures associated with them to establish responsibility for correction and accountability for reporting all necessary infractions to the information flow.

Applying the foregoing comments to end users, data security and data integrity must be integral parts of their operations, too. Where will end users learn about and understand the need for both data security and data integrity? Needless to say, these important facets of data should be included in end-user training; otherwise, a whole host of control and security problems will abound in a typical organization.

CURRENT IC CONTROL APPROACH TO DATA SECURITY AND DATA INTEGRITY

The traditional problems of data security and data integrity—as found within the day-by-day operations of the MIS department—are the same ones found with end users as they interact with the organization's information centers and as they use their computing equipment. Essentially, the increasing use of microcomputers has contributed to a changing perception of data. Because computers are designed to be used by virtually anyone, they can be used for processing, storing, and retrieving data. The result has been an unprecedented access to and use of the wealth of data stored in computer systems—too often with little or no control.

Thus, although computer-abetted fraud, criminal mischief, and theft are the most visible threats to an organization's computer resources, the unintentional, improper use of data remains the largest, most basic data security issue.

In contrast, the need for data integrity is the most common issue—regardless of the type of computer system an organization has. What is different now is that, through the use of micros, many more people have access to centralized data as well as to data belonging to other micro end users. This multiplies the chances that data can be erroneously changed and altered. The value of information is at its greatest when it is new, when it is in context, when it is in quantity, and when it is fully interpreted. Since this describes the state of most of the information residing on microcomputers, the most valuable information an organization owns is often totally unprotected.

Problems with the Current Control Approach

The shift from the single-function terminals traditionally used with minicomputers and mainframes to multifunctional micros emphasizes the growing need to protect an organization's data resources. The microcomputer is able to analyze, copy, store, and communicate vital information without leaving any trace of what has been done. A terminal, on the other hand, can do only what the mainframe allows it to do. Unless appropriate security procedures are in effect, it is possible for a micro end user to download data from a host system, make changes to the data, and then upload the revised data back to the host, leaving no evidence of ever having accessed the data. If that user makes mistakes or unauthorized changes that are unknown to other users, any decisions based in this flawed information may be incorrect. Thus, in the past, computer security meant physical control of the equipment, but, with easy access to microcomputers and floppy diskettes, security has become much more difficult and complicated. Also, maintaining data integrity—the correctness and completeness of data—is growing in importance. The challenges are, first, to ensure that the information is correct when it is input into the system and, second, to make certain that any subsequent queries, additions, or deletions do not destroy the accuracy or timeliness of the data.

Procedures to Overcome Current Control Problems

Recognizing the vulnerability of the data stored on and accessible by microcomputers, organizations have initiated various procedures to cope with these problems. One procedure is to protect micros, software, and data physically by making unauthorized access more difficult. The first

step in controlling who can use computers and data is to restrict physical access to the equipment—locking rooms that contain micros or terminals when they are not in use, using locks to prevent unauthorized people from accessing a keyboard, and instituting sign-on logs to provide a record of who has used the system.

Data Security Measures. With sign-on logs, all end users must sign a log sheet showing when and for what purposes they are accessing the computer. This approach is best suited to environments in which microcomputers or terminals are centrally located, making it easier to control who uses them and when. It does not adequately address the assignment of micros to desktops scattered throughout an organization. Unfortunately, the proliferation of micros and communications equipment both inside and outside the organization has made it harder to restrict physical access to these systems. For this reason, organizations are putting an increased emphasis on controlling access to data and software programs, instead of restricting access to the hardware.

The best way to ensure the continued accuracy of data is to create a system of controls and procedures governing the ways in which end users use software programs and data. The purpose of these controls is twofold. First, controls should ensure that users who should not have access to a system and its data cannot get access to it. Second, these controls should ensure that the data are accurate and current.

One way to control physical access to sensitive information and software programs is to create a data and program library. Users must formally request the data and software applications they wish to use from this library. Again, this approach may not be productive where microcomputers are dispersed because users typically will have their own programs and data files. Because of the shortcomings of access-control methods, password systems are used in situations in which stand-alone micros can access host computers or where micros are linked in a local area network. With the password approach, an end user who wants to access data on the central computer must key in his or her password before the connection can take place.

Passwords should be customized so that they apply to individual users, locations of terminals, specific applications, or any combination of these. Password routines should also be written so that a person attempting to enter the system is automatically disconnected after a limited number of unsuccessful tries. These routines are generally controlled by a program in the central computer. Password systems can be further enhanced by implementing a call-back routine. With this, a user requests access to the central computer by supplying an approved password. After determining the authenticity of the request, the host computer then calls back the user's microcomputer at a predetermined, approved phone number. Only at that point can the user gain access to data and programs. This type of system goes a long way

toward resolving the problem of unauthorized users accessing and changing data—whether they are on or off the organization's premises.

Data Integrity Measures. Once data security measures are in place to ensure that only authorized users are utilizing the computer, they must then ensure that the data input into the system are—and remain—accurate. The importance of inputting data correctly cannot be overstated because inaccuracies tend to multiply. If undetected, a single error can have wide-ranging effects, as the same data are often used in many different ways in different programs. Furthermore, once entered into a system, erroneous data become more difficult to locate. Even if successfully spotted in one part of the system, the data may remain undetected elsewhere.

For example, if the stock number of an item to be shipped to a customer is miskeyed, the inventory or records will be incorrect because the wrong item will be removed from stock to fill the order. In addition, the invoice will charge the customer for the wrong item. If the erroneously keyed item has a price different from the correct item, the customer's accounts receivable will also be wrong. And if the organization uses an automatic inventory replenishment system, the input error will cause the wrong item to be reordered. Thus, the best time to catch mistakes is when the data are first entered into a system. But managing data entry operations is complicated by the variety of ways in which data can be created and entered.

Data can be created and entered by the user, or they can be created by the user and entered into the system by a clerical staff member. Also, new data can be created by using all or part of a user's existing micro data; they can be obtained from an internal central computer or database; or they can be obtained from an external database. Each input or data creation method has advantages and disadvantages.

In micro applications, for example, the user often has the best idea of what the data mean and how they will be used. Thus, the user may want to create and enter the data. Also, it is often faster and easier to enter the data personally, rather than wait for someone else to do it. But having a manager enter data may be an inefficient use of that person's time, and a person who is unfamiliar with keyboarding or data entry procedures can easily input errors without realizing it.

A user who creates data but has someone else enter them can personalize and control the data, while avoiding the drudgery of inputting the data into the system. Nevertheless, the data entry person may lack sufficient understanding of what the data mean, which can lead to errors. The advantages of creating new data from a user's previously input PC data files include significant time and cost savings in data creation as well as the elimination of keyboarding errors. On the other hand, if errors lie undetected in the source data, they will be transferred to the new data files.

Using data already available in the organization's central computer also provides cost savings and eliminates data entry errors. When data from

previous processing are being input to a micro, the original processing program is being used, along with another program to move, format, and possibly manipulate the data in various ways. Bugs or other problems with any of these programs can introduce errors or cause loss of data. In addition, data can become garbled or lost when communicated among computer systems. The accurate data transmitted by a host computer may be inaccurate by the time it is received by a microcomputer due to communications line problems. Although most communications equipment includes built-in error-checking capabilities, bugs in the hardware and software at each end of a link can corrupt data. Communications errors can be controlled by monitoring the equipment.

Going beyond data entry, the process of revising and correcting data may itself introduce new keyboarding errors. For this reason, the revision and correction process must be monitored as vigilantly as the initial data entry. Error-reduction procedures need not be complex to be effective. The adoption of a few basic practices can go a long way toward protecting the integrity of data. These practices include using write/protect tabs on diskettes to prevent the accidental alteration of information, erasing files that are no longer needed, establishing logical file-naming rules, and labeling the diskettes.

Sometimes, the initial data may be error free, but the user's application of it may lead to flawed results. The most common mistake of this type is the unintentional use of outdated and inapplicable data. For example, a strategic planner may be asked to evaluate the potential return on an investment if her company acquires one of its suppliers. Because she has performed similar evaluations in the past, the planner uses data already stored on her micro. The planner is unaware, however, that a recent change in the way in which her company processes financial investment data has made the information stored in her micro obsolete. She performs the evaluation and recommends that her superiors proceed with the deal. A year later, the company is losing money on what originally looked like a profitable venture, and management cannot understand why its projections were so wrong.

Beyond implementing data integrity controls, managers can resolve this type of problem by stressing the critical importance of safeguarding the accuracy and timeliness of data. This can be done by developing a corporation-wide policy outlining responsibility or accountability for the use of data.

IMPORTANCE OF IC EDUCATION TO IMPROVE CONTROL

A most important comment is in order regarding security and control over the data of end users. Who is responsible for educating the users to utilize these data? Who owns the data the users are manipulating? Fundamentally,

the end users are responsible for the accuracy of the final data, including the formulas used in their development (such as in spreadsheets). However, the information center is responsible for the accuracy of the data it provides, and for training, answering questions, and warning users of potential pitfalls.

In light of the foregoing comments, the information center plays a vital role in improving control over the end users' operations. It is up to the information center to school users not only on the control problems that they may encounter, but also on how to overcome them. In this manner, end-user outputs will be accurate and secure, thereby allowing them to be gainfully employed to improve day-by-day operations and organizational productivity.

Going one step further, the information center has an obligation to make sure that management understands the consequences of the improper handling of data, including computer crime, and that end users know what is and what is not acceptable. IC managers should see themselves not only as the enforcers of policy but also as philosophers who guide policy formulation, offer alternative solutions, act as devil's advocates, and interpret final policy for end users. Hence, IC managers need to see themselves less as technocrats and more as facilitators for integrating end users and computers.

These comments, in turn, are related to education. From their first days at work, employees should hear what their technological responsibilities are, and their knowledge of these responsibilities should be reinforced every step of the way. It is the IC's responsibility to indoctrinate these new employees who will become end users in the very near future. It should not be left to a personnel representative. Hence, a few suggested rules on IC education are necessary.

First, the information center must become involved with employee orientation sessions. *Second*, the center must keep users current with updates, synopses of events or trends, and warnings about impending issues. *Third*, the information center staff must be observant; IC managers should walk around and observe how end users are employing their microcomputers. Many organizations might be surprised to discover how much money they have spent to buy what amounts to a "fancy" word processor. Is the technology being used to its full potential, or is it being abused? Remember, abuse of technology is not limited to dishonest end users; it can also come from users who are not using it as it was intended or from those who have no idea how to use it. Walking around may also uncover someone who does have something to hide. Information center managers and their staff are far more likely to notice irregularities than end-user managers who may know little more about the technology than what it costs. The information center is best served by bringing the situations to management's attention and by working to develop policies that will prevent abuse.

IC Management Guidelines to Improve Control

Related to IC education are a number of guidelines that IC management should follow. These guidelines are summarized in Figure 7-1. As discussed previously in this book, a logical starting point for the successful integration of end-user computing technology is to centralize the authority to purchase and to place all equipment and software under the information centers' direction. Likewise, in order to ensure data security and integrity as well as the proper utilization of computing hardware and software, all functions relating to their operations should be vested in the organization's information centers.

Building upon these basic control guidelines, others are set forth in Figure 7-1. They include establishing and maintaining standards over microcomputers, encouraging the development of end-user applications and sharing this information among interested end users, and acting as troubleshooters and informing end users of problems and the measures to take to prevent them in the future. Last, but not least, there is a need for IC management to control the growth of end-user computing in a responsible and progressive manner. As such, computing is introduced in a way that makes sense to meet end-user needs and interests today and tomorrow.

Figure 7-1

IC Management Guidelines to Improve Control over End User Computing via Information Centers

- Evaluate all requests for microcomputers, software, and peripheral devices to ensure that their use meets a justifiable need and is consistent with organization standards.
- Consult with IC management and their staff as to what work best lends itself to the use of microcomputer technology and recommend system configurations and software.
- Get involved in purchasing all hardware and software.
- Install all systems, upgrades, and software.
- Establish and maintain training programs based on the identified needs of end users.
- Evaluate hardware or software to determine its value and effectiveness within the organization.
- Establish and maintain standards for the use of microcomputers.
- Monitor the use and security of systems and data.
- Encourage the development of applications and the sharing of information among end users through controlled media, such as newsletters or company-sponsored user groups.
- Act as troubleshooters and inform end users of problems and the corrective measures to prevent them in the future.
- Foster continuing education of end-user computing.
- Control the growth of end-user computing in a responsible and progressive manner that introduces end-user computing in ways that are sensitive to end-user needs and interests of today and tomorrow.

JUSTIFYING EXISTENCE OF INFORMATION CENTERS

Now that the essentials of IC control and security over information centers have been discussed and related back to IC plans and organization structures, *feedback* is needed to determine whether the organization's information centers are justifying their existence. Essentially, there are two approaches for accomplishing this task. The first approach is to utilize *charge back*, whereby end-user departments pay for the equipment they use, the support and training they receive, and, frequently, a share of the center's overhead. The second approach is to cultivate *active supporters* in the end-user departments. Both of these approaches are discussed below.

Charge-back System Approach

The charge-back system approach is gaining popularity because information center managers regard this approach as a means to both shift the onus of justification away from themselves and reduce the amount of non-productive user requests. About half of the information centers the AMA used in a similar study a year earlier relied on charge backs to help cover the cost of hardware and software purchases. One-third charged end-user departments for installation and hookup costs, and one-fourth billed users for data storage, mainframe connect time, maintenance, and repair. Some also charged end-user departments for overhead and consultation time.

As convenient as the charge-back system seems, it can pose a tremendous risk. The transition from free access to fee access can be a politically tricky one. For example, one information center was quite literally killed by the backlash. In this case, the center never operated as a free service but rather began its existence as a profit center. Nevertheless, the fact that no MIS group in the organization had ever allocated costs for anything but raw computing power was enough to make the idea political dynamite. According to the center's manager, people were used to being charged for processing but not for development or consulting. About a year and a half into its existence, the information center lost its toehold and "got dropped off the bottom of the list." The center had run popular training programs and had made money, with fees in the order of \$50 per hour for consulting and \$100 per hour for development. Considering these successes, the manager deduced that the users' opposition to the charge-back system was the only possible cause of the center's demise.

In reality, end users should justify the information centers, rather than the information centers having to prove their own worth. Unless the ICs get into the mode where they are charging back for their services, end users are going to think of them as a free resource and use them accordingly. Overall, a charge-back system approach should be regarded as a positive action rather than as a "taking of money out of the right pocket to put it into the left."

Changing Allocation of IC Costs over Time. Although the introduction of microcomputers made many traditional MIS functions more accessible

to end users, it also presented IC managers with a new set of cost-allocation considerations. For most information centers, the actual costs of microcomputers and software are easy to allocate. They represent tangible costs that can be billed to each end-user department. More difficult to allocate are the other costs associated with these systems: training, support, and custom-programming costs. The most straightforward allocation method is to charge for these services on an hourly basis. Some organizations include the cost of a few hours of training and support in the price they charge customers for equipment.

The cost of training and support, however, does not remain constant over the life of the machine. End users tend to need a lot of training and support in the beginning, but the need tapers off as they become accustomed to the equipment. Unless the organization is constantly adding new microcomputers and software, this pattern makes it hard to spread out training, support, and consulting costs over the long run. At the same time, if the training and support staffs are allowed to run down in response to diminishing user demand, the organization will be hard pressed to handle the next wave of hardware or software changes.

Charging at least part of the cost to end users keeps user support from being a money losing proposition in slack times, although the IC manager still has to make effective use of the IC professionals. Right now, this concern is more theoretical than practical at many information centers. Most centers are still installing the first wave of microcomputers, and their greatest concern is meeting end-user demands for support and training, not how to keep busy. One way to even out the flow of work for training end users is to offer microcomputer classes on advanced topics, such as how to design and build microcomputer systems using the applications packages that the information centers support.

Active Supporter Approach

Another solution to the problem of justifying an information center's operations is to cultivate proponents or partisans in end-user departments. In effect, information center managers should get out and obtain the active support of end users. What IC managers need to do is to establish a foothold in some department and find a champion there. In this way, the information centers can keep the heat off themselves and let the end users become their proponents by making sure that their bosses know that whatever they are working on has helped them. Then, when it comes time to pay out some dollars, there is already an awareness of how effective the information centers have been.

By the time information centers have reached maturity, many managers discover the value of "word of mouth." For example, one information

center manager credits its end users with a large measure of her information center's success. People in end-user departments have been pretty effective in telling their managers how helpful the center is. In another example, an IC manager and his staff wander around in user departments to pick up information about users' needs and to cultivate an awareness of the information center. In a similar manner, information center managers and their IC professionals should apply the same approach to upper management. If the centers hope to remain vital, they must find ways in which to foster liaisons within their organization's business units and to make direct contact with upper level executives.

By conducting IC executive seminars, information centers not only gain positive visibility, but also help themselves decipher strategic corporate goals. These interactions should not focus on recitations of information center successes, but should provide top managers with just what they need to know about the risks and exposures associated with end-user computing. As a side benefit, executive forums can provide information center managers with insights into possible new markets for their services.

Finally, there is a word of caution in regard to the information centers' use of the active supporter approach. Information centers are most likely to falter when they make the mistake of defining end-user computing and their charter in connection with it too narrowly. They let themselves become so overrun with user demands that they cannot see the strategic view for all the end users in front of them. Information centers should serve as the focal point and the direction setter not just for micros, but also for mainframe-based end-user computing, office automation, and systems development. Thus, a macro viewpoint better serves an end-user proponent approach than some other, narrower viewpoint.

PART VI OF IC QUESTIONNAIRE—CONTROL AND SECURITY OVER INFORMATION CENTERS

Previously, the discussion centered on the ability of the organization's information centers to educate end users in gathering data from a variety of hardware and software environments without affecting performance or data integrity. End users must then be able to massage that data under complete control before distributing the data for use on another variety of hardware and software. Information center involvement helps to educate the end users so as to keep the data accurate across all uses and safe from theft or accidental destruction. The technical problems are not the only ones that arise around the issue of control over data sharing. The others tend to be political in nature, and it requires considerable skills to resolve them amicably.

This is where the *people resource* available to an information center is critically important. Control over timely and accurate decision making by

end users enhances corporate profitability and success. The IC professionals must develop their consulting and educational skills so that they can make compelling presentations of IC capabilities and ensure that those capabilities are put to business use. Accordingly, the information center should place a heavy emphasis on education and on the development both of its staff and of its users.

In consideration of these comments, plus others in the chapter, Part VI of the IC questionnaire can be developed. The central focus of this final part is on proper control over end-user microcomputers and the information centers themselves. Too often in the past, end users have not felt comfortable with microcomputer controls or have found the controls to be poor or simply lacking. From either perspective, conflict has arisen. As noted by some of the questions in this part of the questionnaire, the need for controls to maintain data security and proper controls over data communications are mandatory to ensure data integrity. In addition, there is a need for an independent third-party review to ensure that controls are what they should be. All in all, this last part of the IC questionnaire is concerned with assessing the degree of control over some aspect of end-user computing.

Major Sections of IC Questionnaire—Part VI

As with the previous sections of the IC questionnaire, a number of major sections are presented. They consist of the following:

- Section A. Overall IC Control and Security Considerations
- Section B. Information Center Control
- Section C. Microcomputer Control
- Section D. Security over Information Centers
- Section E. Security over Microcomputers.

These major sections along with their detailed questions are set forth in Figure 7-2. Essentially, they are related to evaluating control over the organization's information centers and control over end-user microcomputers. In the master case study to follow, Part VI is used as a basis for evaluating proper control or lack thereof in the ABC Corporation.

Figure 7-2

Part VI of the IC Questionnaire—Control and Security over Information Centers

	Yes	No	N.A.
Section A. Overall IC Control and Security Considerations:			
1. Does the information center have a policy for controlling the acquisition and usage of microcomputers, i.e., is it actually involved in the growth of microcomputers in the organization?			
2. Does the information center review the cost/benefit			

Figure 7-2 (Continued)

	Yes	No	N.A.
analysis of microcomputers by end-user departments to determine whether a micro or mainframe approach is best for the organization?	_____	_____	_____
3. Does the information center view the acquisition of microcomputers by end users as a way of reducing the organization's backlog of MIS projects?	_____	_____	_____
4. Does the information center periodically review its control mechanism over the acquisition of microcomputers so that end users feel that they are an integral part of the organization's computing capabilities?	_____	_____	_____
5. Are potential abuses to microcomputers and the information center being controlled properly by the appropriate personnel (i.e., IC management and/or internal auditors)?	_____	_____	_____
6. Are all standards that have been set for controlling microcomputers being followed?	_____	_____	_____
7. Have the actual benefits of microcomputers dispersed throughout the organization and the information center been met?	_____	_____	_____
8. Is the information center reviewed periodically by an independent third party for proper control over its operations?	_____	_____	_____
Section B. Information Center Control:			
1. Is control exercised over the information center by its management (i.e., MIS and IC management) acceptable to the end users?	_____	_____	_____
2. Is the information center reviewed periodically by its management (i.e., MIS and IC management) to ensure that it meets end-user needs?	_____	_____	_____
3. Is the information center reviewed periodically so that it is cost effective, i.e., the benefits exceed the costs by an acceptable margin?	_____	_____	_____
4. Is the information center reviewed periodically to ensure that proper security measures are maintained over end-user systems, programs, etc.?	_____	_____	_____
5. Is the information center operated on a basis that is convenient for the end users?	_____	_____	_____
Section C. Microcomputer Control:			
1. Do end users who use microcomputers feel that there is adequate control over them?	_____	_____	_____
2. Is there proper control over systems and program procedures for end-user microcomputers?	_____	_____	_____

Figure 7-2 (Continued)

	Yes	No	N.A.
3. Is there data integrity with the end-user microcomputers, i.e., are the databases of the micro(s) and mainframe(s) one and the same at all times?	_____	_____	_____
4. Is there proper control over the data communications network, including local area networks?	_____	_____	_____
5. Are the proper types of controls over microcomputers reviewed periodically by an independent third party, i.e., internal and/or external auditors and consultants?	_____	_____	_____
Section D. Security over Information Centers:			
1. Are there effective controls in place to avert theft or destruction of information center hardware?	_____	_____	_____
2. Are there effective controls in place to avert theft or destruction of information center software?	_____	_____	_____
3. Are there effective controls in place to safeguard end-user projects that are under way?	_____	_____	_____
4. Are passwords and security lists used—if deemed appropriate—to gain access to information center hardware?	_____	_____	_____
5. Are the information centers locked at the appropriate times (such as in the evenings) so that unauthorized personnel cannot gain access to the computing facilities?	_____	_____	_____
6. Are the information centers located in areas that can be secured without too much difficulty?	_____	_____	_____
7. Is there a periodic surprise audit of the information center by an independent third party to uncover security irregularities?	_____	_____	_____
Section E. Security over Microcomputers:			
1. Has proper control been placed over the microcomputers that are utilized by end users, i.e., have security measures been taken to ensure microcomputer protection from adversaries within and outside the organization?	_____	_____	_____
2. Are there effective controls in place for end users to avert theft of information from the microcomputers throughout the organization?	_____	_____	_____
3. Are there effective controls in place to take care of lost or damaged disks/diskettes?	_____	_____	_____
4. Have end users been trained in undertaking the proper security measures to protect their microcomputers?	_____	_____	_____
5. Have end users been trained in undertaking the proper security measures to protect their micro programs, i.e., software?	_____	_____	_____

ABC CORPORATION—CONTROL AND SECURITY OVER INFORMATION CENTERS AND MICROCOMPUTERS

By way of review, a number of problems regarding the operations of the ABC Corporation's five information centers have been highlighted in the previous chapters. An examination of the prior negative answers via the IC questionnaire indicates that IC management is not in full control. Although the technical aspects of running the information centers are carried out in an acceptable manner, the same cannot be said for matters relating to the human element. More specifically, the management of the MIS department lacks leadership in getting the required number of computer professionals to staff both the MIS department and its relatively new information centers. Of equal importance is the department's inability to solve personnel problems that arise from computer conflict. Instead of facing the problem directly, the reverse is happening. As end users get more control over computing resources, the level of anxiety felt by IC professionals is increasing. Needless to say, MIS management, working in conjunction with IC management, should investigate ways to improve relations between IC professionals and end users to eliminate this increasing conflict.

Control Problems over Information Centers and Microcomputers

MIS and IC management is losing control over its operations because of its *modus operandi*. The management is practicing "management by exception" rather than "management by perception." The first approach refers to fixing what has gone wrong after the fact, i.e., being reactive; the second approach looks into the future, determines what is wrong, and makes plans to minimize these problems so that the managers are always in control—they are proactive rather than reactive. Unfortunately, management by perception is not the case for the MIS and IC managers of the ABC Corporation. Their lack of control over the information centers themselves and over end-user microcomputers becomes evident in the next section when current control problems are evaluated.

Evaluation of Control Problems over Information Centers and Microcomputers

The foregoing background, which is a condensation of previous materials, provides a basis for evaluating control over the corporation's five information centers as well as the microcomputers that are utilized by the end users. Utilizing Part VI of the IC questionnaire (refer to Figure 7-2), all "no" answers that are applicable are answered in Figure 7-3. All the negative answers are discussed below.

In Section A, Overall IC Control and Security Considerations, the first six questions were answered negatively. Several important factors underlie

Figure 7-3

Explanations for the "No" Answers in Part VI of the IC Questionnaire—Control and Security over Information Centers (see Figure 7-2)

Section A. Overall IC Control and Security Considerations:

- A.1. Although the information centers assist end users in acquiring and using microcomputers, the centers have no voice in micro acquisition since this is left to the functional unit that is acquiring them. Hence, the information centers have virtually no control over the number of micros acquired throughout the corporation.
- A.2. Because there is no real policy regarding the acquisition of microcomputers throughout the corporation, microcomputers generally are acquired without a cost/benefit analysis. The rationale by the acquiring functional unit is the low cost of micros.
- A.3. Because there has been and continues to be friction between the information centers and the end users, the MIS department looks upon end users as threats to their existence and not as a way of reducing their own backlog.
- A.4. Currently, the information centers do not have a policy (as noted in question 1) or a control mechanism over the acquisition of microcomputers.
- A.5. Because end users have control over their microcomputers, they look to themselves for the proper level of control, which could prove to be totally inadequate if put to a test. Although the MIS department has adequate control over the information centers, the same cannot be said for control over end users.
- A.6. Since standards have not been formally set to control microcomputers of end users, they cannot be followed. It is unfortunate that the standards for microcomputers in the information centers are not used for the end users.

Section B. Information Center Control:

None of the questions were answered no.

Section C. Microcomputer Control:

- C.3. Although an attempt has been made to have the databases of both mainframe and microcomputers the same, many times the databases are different because of the time factor. That is, micro databases extracted from the mainframe in the morning will be different shortly thereafter, thereby causing discrepancies between the two databases for answering current management and operational questions.
- C.5. Currently, the annual audit conducted by outside auditors does not include reviewing the proper type of controls over microcomputers.

Section D. Security over Information Centers:

None of the questions were answered no.

Section E. Security over Microcomputers:

- E.2. Although controls are in place to avert theft of information from the information centers, the same cannot be said for the microcomputers of end users. End users do not perceive that the loss of information is important to anyone but themselves.

the "no" answers to questions 1 through 4. First, the information centers do not have a policy for controlling the acquisition and usage of microcomputers by end users. It is up to the end users and not the information centers. Second, the information centers do not review the cost/benefit analysis of microcomputers by functional units of the corporation. Third, the information centers do not view the acquisition of microcomputers by the end users as a way of reducing the backlog of MIS computer projects. In effect, the corporation's information centers look upon end users as threats to their existence and not as a means of reducing their own backlog. In fact, some of the experienced MIS professionals have been allocated to the information centers to the detriment of the MIS department. Finally, the information centers do not review the control over the acquisition of microcomputers in such a way that end users feel that they are an integral part of the corporation's computing capabilities. As pointed out several times previously, the end users acquire their own micros without help from the information centers. As a result, both groups tend to go their own separate ways without regard to one another. The negative answers to questions 5 and 6 indicate that abuses to microcomputers are not being properly controlled and not all of the standards set for controlling microcomputers are being followed. Overall, the number of questions answered negatively is a good indication that considerable work must be undertaken to get the corporation's information centers under control.

Although all the questions in Section B, Information Center Control, were answered affirmatively, there is a need to look more closely. Just because information center control is perceived to be adequate by both MIS and IC management does not necessarily mean that it really is adequate. There is a need to look also at the next section of the IC questionnaire. In terms of Section C, Microcomputer Control, question 3 indicates that there is a lack of data integrity since the databases of the end users may not be one and the same at all times with the computer mainframe. The reason is that data from a mainframe for a micro may change after it is extracted, thereby causing inconsistency immediately between the two databases for answering current managerial and operational questions. In addition, question 5 indicates that the proper type of controls over microcomputers are not reviewed periodically by an independent third party. Basically, the annual audit by outside auditors does not provide for reviewing these types of controls.

All of the questions in Section D, Security over Information Centers, were answered affirmatively; in Section E, Security over Microcomputers, only question 2 was answered negatively. Although the responses to the questions in both sections indicate a high degree of security, this question (E.2) centers on a major security problem over theft of information from the microcomputers that are spread throughout the corporation. Essentially, end users do not perceive the loss of information to be of any importance to anyone but themselves. Hence, end users do not look upon

corporate information as a corporate asset, but merely as useful information for everyday operations, which is of no use to anyone else.

Recommendations to Improve Control over Information Centers and Microcomputers

Appropriate recommendations to overcome or reduce the above problems to a tolerable level can take several directions. *First*, from a broad viewpoint, they should take the form of developing an appropriate control environment. *Second*, specific control recommendations are needed for security measures over microcomputers. *Third*, there is a need to establish a minimum set of standards to control everyday operations. All of these recommendations are covered separately below. In addition, other recommendations, in the form of guidelines, can be included. Typical guidelines are found in Chapters 8, 9, and 10 for corporate management, IC professionals, and end users, respectively.

Development of an Appropriate Control Environment. As the ABC Corporation has learned from its five information centers, the microcomputer environment is quite different from that of the computer mainframe. End-user programs can be written in easily learned fourth-generation programming languages. Control over program changes, data security, system documentation, backup and recovery plans, and system testing are firmly ingrained in the mainframe environment, but similar protection is not present currently in the microcomputers spread throughout the corporation. The net result is that the possibility of errors is more prevalent. Many end users feel that the results obtained from a microcomputer are errorless; in reality, the implementation of an appropriate control environment is required to reduce the risk of errors—unplanned or otherwise. Without controls, microcomputers for the ABC Corporation, (or, for that matter, for any corporation), can produce incorrect results faster than previously was possible.

In the current microcomputer environment that exists throughout the corporation, the number of low and middle technical skill users involved in using microcomputers has increased. As more and more end users become computer competent, the possibility exists for an even greater expansion of errors, security problems, and so on. The approach useful in this environment should measure risk based upon different microcomputer system structures and uses, and enable the corporation to select controls that minimize risk and also meet cost/benefit criteria. In addition, risks are present to some degree in all types of microcomputer applications.

A feasible approach is to develop a control environment that has three basic steps: (1) identify potential exposure, (2) assess the risk associated with the exposure, and (3) select controls with emphasis on cost/benefit justification. *First*, in order to determine the potential exposure associated with microcomputer applications, corporate management assesses the

impact on the corporation should a detrimental event occur. Detrimental events can be caused by natural, accidental, or deliberate occurrences. *Second*, by assigning a degree of risk to the exposure, it is possible to assess the system's overall vulnerability. Risk can be assigned using a high, moderate, or low rating. *Third*, in order to select controls that are cost/benefit justified, it is necessary to have at least basic controls over microcomputers. These include security, backup and recovery, data integrity, and input/output controls. Due to space limitations, security measures are our focus of attention here.

Utilization of Security Measures over Microcomputers. As indicated above, security over the five information centers is not a major problem, but control over microcomputers is. Due to the magnitude of this problem, security is an issue under joint review by the MIS department and the internal audit department at corporate headquarters. Microcomputer security is viewed as a subset of computer security, which is itself a subset of corporate data security. Thus, microcomputers merely introduce variations on well-developed themes.

Due to the newness of the five information centers, MIS management is promoting the following commonsense security procedures:

- Backing up both hard and floppy disks with additional floppy disks or tape cassettes
- Enforcing standards against illegal copying of software
- Securing storage microcomputer media from theft or damage
- Applying existing standards for protecting office equipment from theft or unauthorized use.

Responsibility for enforcing these security measures rests with local management at each plant. In addition, the audit department at corporate headquarters has announced that it will ensure accountability by reviewing such procedures during its regular audits. In this manner, the ABC Corporation is making a good start on developing appropriate security measures over the microcomputers that exist throughout the organization.

Establishment of a Minimum Set of Standards. Related to security measures is the need to establish a minimum set of standards. Although they are very important, standards are almost certainly overlooked by end users. Important standards germane to the ABC Corporation that must be set up include the following: (1) equipment compatibility, (2) communication standards (micro-to-mainframe communications and micro-to-micro standards), (3) diskette file-naming conventions, (4) data security standards, (5) documentation (program and procedure) standards, and (6) program development and testing. The first standard—equipment compatibility—is extremely important as evidenced by the number of “no” answers in Part VI of the IC questionnaire. The establishment of the above standard operating procedures that is agreeable to both IC professionals

and end users will go a long way toward reducing conflict between the two groups. Hence, appropriate standards can be extremely helpful in integrating the interests of both groups from the short term to the long term.

CHAPTER SUMMARY

As stressed throughout the chapter, control and security over end-user computing ultimately is the primary responsibility of IC management. Are microcomputers being used for the approved purpose? Are all security procedures being followed? Have end-user computing needs met expectations? Are there any data integrity abuses? These are only a few of the questions to be answered. In this chapter, many of these control questions were answered in relation to information centers and their management.

Due to the need for control over end-user data security and data integrity, important issues were addressed in the chapter. Current problems in these areas along with appropriate procedures to overcome them were presented. An effective way to improve control in these areas and others is through information center education. In turn, the importance of education is a means for justifying the organization's information centers. In the final part of the chapter, the last part (Part VI) of the IC questionnaire was presented along with its application to the ABC Corporation.

SELECTED REFERENCES

- Allen, B., "Make Information Services Pay Its Way," *Harvard Business Review*, January-February 1987
- Atkins, W., "Jesse James at the Terminal," *Harvard Business Review*, July-August 1985
- Bacon, C. N., "DP Fraud: Six Opportunities," *Infosystems*, July 1986
- Ballester, G. B., "A Proposal for IC Quality Control," *Information Center*, July 1985
- Basu, D., "Data Security That Works," *Business Software Review*, November 1986
- Beaver, J. E., "Micros on the Rebound," *Computer Decisions*, May 21, 1985
- Bergstrom, L. P., "Market-Based Chargeback in the Data Center," *Business Software Review*, November 1987
- Bloombecker, J., "Lobbying for Protection," *Computerworld*, August 4, 1986
- Buss, M. D. J., and L. M. Salerno, "Common Sense and Computer Security," *Harvard Business Review*, March-April 1984
- Cashin, J., "As Systems Spread out Data Becomes Vulnerable," *Software News*, December 1986
- Cook, R., "Who Picks up the Info-Center Tab?" *Computer Decisions*, January 29, 1985
- Couger, J. D., "E Pluribus Computum," *Harvard Business Review*, September-October 1986
- Dodge, F., "Security Implication of the Micro-Mainframe Connection," *Software News*, April 1985
- Dounis, J., and S. Efroymsen, "Controlling Excess Access," *Information Center*, December 1985

- Durr, M., "Ins and Outs of Data Integrity," *Micro Communications*, January 1985
- Elkins, T. A., "Upgrading Proves Cost-Effective for Immediate PC Expansion," *Computerworld*, May 5, 1986
- Emery, J., "New Goal for Chargeback: Shift from Cost Accounting to a Positive Balance," *Computerworld*, October 13, 1986
- Friedman, S., "Customized Policies for Micro Protection," *Micro Manager*, July 1984
- _____, "The Information Center: Taking Control," *Micro Manager*, May 1984
- Galbraith, L., "The Art of Encryption," *DEC Professional*, March 1987
- Hall-Sheehy, J., "On Computer Crime," *Information Center*, February 1987
- _____, "Who's in Control?," *Information Center*, March 1986
- _____, "Why You Need Standards," *Information Center*, August 1986
- Hargrove, R. D., "Safeguarding Corporate Assets, Toward End-User Security Awareness," *Data Training*, August 1985
- Howe, C. L., and R. Rosenberg, "Government Plans for Data Security Spill Over to Civilian Networks," *Data Communications*, March 1987
- Jeffrey, D., "Measure IC Staff Performance," *Information Center*, October 1986
- Johnston, R. E., "Data Security Products Roundup: Loose Lips Sink System," *Infosystems*, April 1986
- _____, "How to Select and Implement a Data Security Product," *Infosystems*, part I, January 1984; part II, February 1984; part III, March 1984
- Juris, R., "Keeping out the Insiders," *Computer Decisions*, November 4, 1986
- Kador, J., "An IC Characterized by Tight Central Control," *Information Center*, August 1985
- Kanter, J., "A PC Manifesto for Managers," *Infosystems*, September 1985
- Karten, N., "So Who Needs Info Centers?," *Computerworld*, August 11, 1986
- Kelleher, J., "Information Centers, Their Choice: Justifying Existence or Go out of Business," *Computerworld*, August 11, 1986
- Krema, J. F., "Computer Crime: What It Is and How to Counter It," *The Office*, March 1986
- Lee, J. A., G. Segal, and J. Steier, "Positive Alternatives: A Report on ACM Panel and Hacking," *The Communications of the ACM*, April 1986
- Major, M. J., "Security and Privacy in an Electronic Age," *Business Software Review*, April 1987
- Makley, W. K., "Computer Security's Worst Enemy: Management Apathy," *The Office*, March 1987
- Martin, T. A., "Getting to the Root of the Security Problem," *Software News*, October 1985
- _____, "Security Is Unlike Other Types of DP Planning," *Software News*, November 1985
- Minoli, D., "Protecting Communications from Disaster," *Infosystems*, February 1986
- Naecker, P. A., "Secure Your System!," *DEC Professional*, March 1987
- Naib, F., "Technical Review Exposes Weaknesses of Micro Systems," *Computerworld*, December 16, 1985
- Nekoranik, A., "Personal Computers: A Data Center Dilemma," *Infosystems*, March 1986
- Nesbit, I. S., "On Thin Ice: Micros and Data Integrity," *Datamation*, November 1, 1985

- Paller, A., "Charting Corporate Quality," *Information Center*, April 1986
- Parker, D. B., and S. H. Nycum, "Computer Crime," *The Communications of the ACM*, April 1984
- Perryman, P., "Standards and Documentation," *Information Center*, August 1985
- Perschke, G. A., and S. J. Karabin, "Four Steps to Information Security," *Journal of Accountancy*, April 1986
- Phillips, D. B., "The Responsible Use of Data," *Information Center*, February 1987
- Rau, K., "Emergence of PCs Creating More Data-Network Security Problems," *Office Systems*, February 1987
- Riggs, J. R., "Twelve DP Myths That Just Won't Die," *Computerworld*, October 6, 1986
- Santarelli, M-B, "Accounting for Value," *Information Center*, August 1986
- Seymour, J., "Locking up Your Information Assets," *Today's Office*, April 1985
- Sherizen, S., and G. Marx, "Technology: Invader or Protector of Privacy?," *Computerworld*, July 28, 1986
- Steinbrecker, D., "Getting a Lock on Controlling Corporate Data," *Today's Office*, May 1987
- Sullivan-Trainor, M., "Utility's Info Center Frees DP Staff for Sophisticated Projects," *Computerworld*, August 11, 1986
- Troy, G., "Thwarting the Hackers," *Datamation*, July 1, 1984
- Wong, R., "One-Time Passwords Fortify System Security," *Computerworld*, December 22, 1985
- Zimmerman, J. S., "Is Your Computer Insecure?," *Datamation*, May 15, 1985
- , "PC Security: So What's New?," *Datamation*, November 1, 1985

Part V

Management Guidelines for Effective Information Centers

8

MANAGEMENT GUIDELINES TO INTEGRATE INTERESTS OF IC PROFESSIONALS AND END USERS

ISSUES RAISED AND EXPLORED

- To explore a working relationship between IC professionals and end users that starts with corporate management.
- To develop a strategy for corporate management to follow for integrating interests.
- To discuss the major computer challenges posed by end users for corporate management.
- To present the do's and don'ts of corporate policies and procedures for corporate management to follow in order to integrate interests.
- To offer appropriate management guidelines for corporate management to follow in order to integrate interests.

OUTLINE

Introduction to Management Guidelines to Integrate Interests of IC Professionals and End Users

Establishment of an Effective Working Relationship between IC Professionals and End Users That Starts with Corporate Management

Working out a Strategy for Corporate Management to Integrate Interests

Major Microcomputer Challenges

Establishment of Corporate Policies and Procedures

- Implementation of Corporate Policies and Procedures
- Do's and Don'ts of Corporate Policies and Procedures
- Eight Management Guidelines for Corporate Management to Integrate Interests
 - Overall Strategy for Successful Information Centers
 - Top-Down Approach That Ties in with Information Centers
 - Areas of Concern for Acquiring Microcomputer Systems
 - Methods to Overcome Microcomputer System Incompatibility
 - Micro-Mainframe Link for Data Compatibility
 - Integration of Corporate Databases between Mainframe and Microcomputers
 - Establishment of Responsibility and Control over Microcomputers
 - Establishment of Standards for Microcomputer Security
- Utilization of Management Guidelines for Integrating Interests of IC Professionals and End Users
- Chapter Summary
- Note
- Selected References

INTRODUCTION TO MANAGEMENT GUIDELINES TO INTEGRATE INTERESTS OF IC PROFESSIONALS AND END USERS

The material in this chapter builds upon the previous ones; that is, appropriate corporate management guidelines are developed as a way of offering constructive recommendations to improve the operations of information centers. In turn, these guidelines are helpful in integrating the interests of IC professionals and end users. A successful integration of these interests should eliminate or, at least, reduce the computer conflict between the two groups. For the most part, these guidelines are related directly or indirectly to planning over information centers. However, reference is not to planning prior to the development of the information centers, but positioning the organization's information centers for future strategic growth and creating a climate for change and human understanding. Typically, the first year in the development of information centers is a period of novelty and quick acceptance, but about two years after the establishment of the ICs, the end-user community starts to ask questions and to doubt the IC professionals because the users have caught up with the information center staff in technical expertise and are leaping ahead. At about two years of age, the information centers can, like a marathon runner, "hit the wall" and, without proper planning, drop out of the race. Staff burnout occurs at this point, and flabbiness sets in. The guidelines developed in this chapter and the remaining chapters of the text are designed to overcome such typical information center problems.

ESTABLISHMENT OF AN EFFECTIVE WORKING RELATIONSHIP BETWEEN IC PROFESSIONALS AND END USERS THAT STARTS WITH CORPORATE MANAGEMENT

Typically, only corporate management has the proper perspective for the organization's overall needs; they know best how the system function can serve as a unifying and coordinating force that centers on the total picture. Computer professionals, on the other hand, are the ones who know best how to achieve the desired results in the most cost-effective manner. If this distinction is accepted and agreed upon, it is clear that the participative role must extend to all levels. It cannot be the sole responsibility of MIS professionals, including IC professionals through the information centers, nor the sole responsibility of corporate management. In discharging this responsibility as members of corporate management or as MIS and IC professionals, specific working relationships must be clearly understood.

Just as an effective working relationship is needed between corporate management and IC professionals, the same needs to be said about a relationship between these professionals and end users. Generally, microcomputer systems which are designed by end users without the direct involvement of IC professionals reflect their needs as they conceptualize them. However, learning how to design these systems is accomplished through the information centers. Such systems are responsive to the dynamics of business; they reflect real life situations; and, often, they introduce degrees of sophistication and complexity that may be difficult for end users.

Having made the point that a working relationship is needed, a most effective way to utilize the talents of corporate management, IC professionals, and end users lies in *creativity*. Creativity helps close the gaps by leading beyond the conventions of the present methods. In the past, the computer was feared because it was deemed capable of displacing personnel; such fears, however, proved to be unfounded. Instead, within a newer computerized MIS environment, the computer can actually enrich jobs by allowing personnel to examine new patterns of performance. When creative solutions are synthesized, the end result is that some decision alternatives are better than others. Hence, decision alternatives are evaluated without emotional or self-serving influence so that the alternative chosen will, in fact, be the best one.

WORKING OUT A STRATEGY FOR CORPORATE MANAGEMENT TO INTEGRATE INTERESTS

The basis for an effective working relationship between IC professionals and end users centers on corporate management's developing an effective strategy that ties together the interests of all parties. Such a strategy takes into account major microcomputer challenges, followed by the establishment and implementation of corporate policies and procedures. All of these important elements of working out a strategy are discussed below along with the do's and don'ts of corporate policies and procedures.

Major Microcomputer Challenges

Before developing an overall strategy that is contained in corporate policies and procedures, it is helpful to look at the major challenges posed by microcomputers. As one IC manager stated recently, it doesn't pay to overanalyze the small differences between microcomputers. The main benefit, initially, accrues to the end user working one-to-one with the machine. It's more important to get something done than to be perfect in the equipment selection. From another view, one MIS manager was quoted as saying: "I'm convinced that microcomputers are evil. With them, there's no way to control the quality of programs or the integrity of data. Instead of taking the time and money to build centralized databases, you're taking the easy way out and that will cost much more in the long run."

The above proclamations delineate the escalating debate being fought across corporate America over the merits of microcomputers. One side comprises enthusiasts who see tremendous benefits accruing from this power and support its immediate proliferation. On the other side of the debate are those who see only bad seeds and chaos in the machines and want nothing to do with them. Somewhere in the middle lie the sentiments of the majority. Faced with the irreversible reality of the microcomputer's entrenchment in executive ranks, this middle-of-the-road group more than likely acknowledges that organizations reap significant benefits from using the machines; at the same time, they are aware of the potential problems.

There is no question that "microcomputer mania" has hit corporate America—and that the microcomputer is the tool of choice. The figures speak for themselves. Mainframe- and minicomputer-based systems are widely used, but their use is not growing, and they do not raise the same issues as stand-alone microcomputers. While corporate America seems to have fallen for microcomputers, there is a strong element of ambivalence. For, contained within the power to increase productivity and enhance creativity, there is also the potential to foment chaos. Perhaps the biggest challenge posed by microcomputers to corporate management is how to increase the power of end users without ruining the organization. In other words, how does the typical corporate manager leverage end-user competency and, at the same time, retain corporate commitment? If end users become more powerful without working toward the same corporate goals, the end result may well be chaos.

Establishment of Corporate Policies and Procedures

Before stating how to overcome such a chaotic situation, it should be remembered that many microcomputers are sold on the idea that they are allowing end users to have control over their computing needs. The key word here is "control." Peter Keen, formerly a professor of management at the Massachusetts Institute of Technology, notes a problem with the word

control. The moment centralized data processing promulgates anything about controlling microcomputers, users substitute the word "preventing."¹ Hence, they see this as yet another plan by the MIS department to protect its own territory.

Because control is a loaded word, it is suggested that corporate policies and procedures be used since managers are familiar with their use. The ultimate purpose of these corporate policies and procedures, which center on microcomputers, is the maintenance of control over them. Thus, there is an easy way to establish the desired level of control through the utilization of corporate policies and procedures.

Implementation of Corporate Policies and Procedures

Due to the wide number of hardware and software choices, many organizations are using a "cut-and-try" policy: "If you want a microcomputer and certain software, it has to be an IBM PC (or at least a microcomputer that runs the same software)." The motivation for this approach can be viewed as follows: "Why make extra headaches for yourself? By letting in just one brand, you don't have to work double time to make machines communicate with one another." Similar sentiments are expressed by the MIS and IC managers all over the country who are responsible for making the machines talk to each other.

If corporate management wants to exploit the potential of microcomputers, many organizations are not utilizing the "buy" IBM-only philosophy. They recognize that some machines, for certain applications, are better than others. There are also those who believe that solving technical compatibility problems is actually easier than trying to persuade end users to comply with a one-machine policy. Excerpts from a typical microcomputer policy that allows for procuring different micros is found in Figure 8-1.

Besides wanting to satisfy the tastes of individual users, there is another reason an organization might justify more than one brand of machines. It has to do with how the organization perceives the future. Looking down the road, those who have embraced an IBM-only policy see the massive amount of software that has been and will be produced for the microcomputer. And they see the potential networking problems of a multimicro setup. Knowing that an organization wants to network these micros, it would be shortsighted to go any other way. For example, one end user could develop her own program for the Apple. Now, she has to spend three months reentering the data and trying to learn a new microcomputer, which contradicts the reasons for end users buying micros—to do things faster and better.

In contrast to the foregoing corporate computer policy, a computer procedure is much smaller in scope and complements the policy. Typically, a microcomputer acquisition procedure starts with a set of questions.

Figure 8-1

Excerpts from a Microcomputer Policy for Conferring with the Information Center

Hardware. A microcomputer can be justified if it increases your productivity, reduces staff, takes the place of existing or planned equipment, or provides a service that no other department within the organization can provide. The information center is available to help you make these determinations as well as offer limited use of its own microcomputers. That will help you determine exact applications and software requirements before you decide to make a request for a specific configuration.

Selecting a micro. The information center will help determine the type of microcomputer you need. At present, we have limited you to five main vendors, but will continue to review all new offerings.

Software. Applications software meets a specific need that can be met easily or completely by using a general-management software product. It can be purchased as a package, written by end users, or written by a consultant. Such software is developed using non-procedural languages, i.e., fourth-generation languages. The information center will advise the user on preparing a requirements document as the initial step in software acquisition. Users should, whenever possible, avoid writing their own operating systems or modifying packages when the end objective constitutes a part of a permanent operating process, requires maintenance of extensive data files, or involves sequentially executing a number of programs.

Communications. Emulation is available for microcomputers. All contracts for outside, dialup services must be negotiated by the information center.

Security. Data that may be confidential or subject to interest by outside parties must be protected. Additionally, any proprietary information should be handled in a manner similar to all other end-user data. Equipment and programs must be protected from theft and unauthorized use. Some applications may require additional security and control measures.

Typical questions are set forth in Figure 8-2. End users complete these questions before requesting a microcomputer. From this perspective, a true need for a microcomputer can be identified.

Do's and Don'ts of Corporate Policies and Procedures

Although implementing appropriate corporate policies and procedures can be viewed as a winning strategy for corporate management to reduce or eliminate corporate conflict, there are several caveats. For one, establishing rules that say "something can or cannot be done" is one way to control end users. The idea is to influence behavior by setting up parameters. But there is a subtler approach. The information center can say to end users: "We won't restrict your activities and you can buy anything you want. But, if you want help from us, you must follow these guidelines. If you don't follow them, you're on your own." Such a policy

Figure 8-2

Typical Microcomputer Acquisition Procedure

1. Describe the function(s) that will be performed on the requested microcomputer and the anticipated frequency of use. Attach an example of the desired output, including formulas used and source of input (if available).
2. Have you discussed with the information center the use of existing automated resources (such as mainframe computing or office automation) to accomplish this processing? If so, indicate the person(s) contacted.
3. What benefits (such as cost reduction, increased productivity, or improved management information) do you anticipate as a result of acquiring a microcomputer?
4. If you have already investigated microcomputers (such as equipment and programs), are there any specific items you require? For example, specific software, special printing capabilities, and so on are required.
5. Have you considered using the microcomputers available in other departments? If not, please state the reasons that warrant a dedicated machine in your department. For example, confidentiality of data, immediacy, frequency of use, timely processing, and so on are necessary.
6. What budget amount have you established for this acquisition, including software?
7. Since custom programming is not offered, have you evaluated the time and skills required of your staff to implement this acquisition?

could be called *laissez-faire* with a coercive punch. It is an approach that gives the policymaker and the user clearly defined responsibilities. It is collaborative, and yet it sets out strict limits of corporate tolerance.

Going one step further, control goes hand in hand with support. If there is control without support, controls will be seen as intrusive. The information center has to make it easier for end users to go the right way. If the information center offers end users all the support they could ever want, who would refuse it? And, by offering that kind of support, the information center really finds out who is doing what. The last point is vital. Support programs allow managers to monitor microcomputer usage in a natural, unthreatening way. That is important to any effort made to maintain accountability, security, and data integrity.

The issue of control goes much deeper than what kinds of microcomputers are purchased. There is the problem of trying to control what end users do with them, and, among those who are attuned to the personal freedom rhetoric, such intentions are not likely to be well received. Images of managers looking over subordinates' shoulders will no doubt be conjured up. And yet, the potential for the chaos that could result from uncontrolled use cannot be denied.

Data integrity is a primary management concern. If end users are collecting dissimilar data, plugging them into their spreadsheets, and

manipulating them with their own processing power, contradictory conclusions that will not be easily reconciled are likely to be drawn. Confusion and waste will be the result. To keep this problem within manageable bounds, organizations of any substantial size are compelled to build comprehensive databases that give the far-flung microcomputers a common pool to tap. By design, the pool resolves whatever discrepancies might exist in the data used by different departments.

Even under the best conditions, data integrity is difficult to enforce. To lessen the confusion, it is suggested that a logo be tacked to all reports that use the official data in order to distinguish them from others which do not use official data. If this idea is implemented, all reports that do not have the logo will be treated with instant suspicion. This problem is not as acute when end users use pencil and paper; these are immediately suspicious. One tends to assume that a report on a computer-generated printout is based on accurate data and must be correct.

Ultimately, microcomputing policies and procedures must give the power to veto requests for microcomputers. Control, after all, comes down to having the power to say "No," and make it stick. Even so, a corporate policy that contains such a final word does not have to be harsh for end users. By setting up the right checkpoints—like sign-off procedures and cost-benefit analysis requirements—an organization can help end users determine in advance when the answer is going to be "No," or at least when management will recommend that the user share a nearby microcomputer. Providing a consistent framework in which to judge user requests for microcomputers will mitigate the effect the negative answer can have on the enthusiasm of end users.

EIGHT MANAGEMENT GUIDELINES FOR CORPORATE MANAGEMENT TO INTEGRATE INTERESTS

Inasmuch as end users working with IC professionals need considerable direction to realize the full potential of microcomputing activities, corporate management must lead in this important area by employing the following appropriate guidelines:

1. Overall strategy for successful information centers
2. Top-down approach that ties in with information centers
3. Areas of concern for acquiring microcomputer systems
4. Methods to overcome microcomputer system incompatibility
5. Micro-mainframe link for data compatibility
6. Integration of corporate databases between mainframe and microcomputers
7. Establishment of responsibility and control over microcomputers
8. Establishment of standards for microcomputer security.

Due to the importance of each of these management guidelines, they are all explored below.

Application of these guidelines by corporate management will go a long way toward improving the operations of information centers today and tomorrow. Corporate management that fails to assess its microcomputing needs risks having short-lived systems—investments that cannot be leveraged as technology improves. Worse, spontaneous flashes of innovation by end users, armed with microcomputing tools, may be unproductive or even counterproductive. These tools should be catalysts for improving corporate effectiveness, not the opposite.

Overall Strategy for Successful Information Centers

As a starting point for an effective overall strategy of information centers, corporate management must completely understand what information centers are. Most successful information centers gradually migrate into more than just places to learn how to use microcomputers. The centers become the focal point for developing new applications as well as supplying information and expertise on microcomputer issues, ranging from how to choose the right micro to how to use one productively on the job.

Framework for an Effective Overall Strategy. If the information centers are viewed from this macro perspective, end users become knowledgeable about different equipment, the capabilities and limitations of each, and the applications software available. In addition, the end users can be taught the importance of dealing with data consistently and the advantage of being able to share data across applications. At the same time, the IC professionals will gain insight into the end users' needs and the kinds of support that will be required on an ongoing basis.

In this environment, IC professionals can begin to win the cooperation and understanding of end users and begin to develop the ability to influence users. If IC professionals consider themselves as supportive to end users, users will naturally look to them for advice and support. This situation will allow both IC professionals and end users the optimum combination of access and control over data.

Within this broad framework, corporate management must state a mission and an objective that support a strategy for the information centers. Fundamentally, the *mission* is to serve as a source of tools to assist end users in addressing business opportunities and problems along with their solutions. The *objective* is to help the users become self-sufficient enough to address their own computing needs. On the other hand, the *strategy* is to provide microcomputing services through education of micro hardware and software as well as end-user assistance via information centers. The importance of this strategy is to eliminate the barriers that have prevented end users from increasing their productivity and improving decision making. Underlying this strategy for end-user microcomputing is a need to guide

the initial setup and to ensure the consistent operations of the information centers. This especially relates to the area of control. Control over end-user activities should be nominal in order to attract users; too much control will drive them away. From this view, IC professionals should help end users fulfill their needs in every way possible, but short of doing all the work for them.

To translate effectively the strategy of the information centers into reality, the startup of the information centers should be slow and deliberate. By having the IC professionals develop typical end-user solutions (just this once) in advance, they can then lead end users through a process by which they arrive at the same solutions. End users will indirectly tout the information center and its staff. Although this approach requires a large investment of staff time by starting slowly, it allows the facility to be gradually opened to more end users. In other words, the information centers should "learn to crawl before they walk." Overall, the early success of the information centers depends largely on the experience of the initial end users.

Once the initial efforts are successfully under way for the organization's information centers, corporate management must develop a definite corporate policy for them. In effect, it must decide on making microcomputers an integral part of the corporate planning process.

Top-Down Approach That Ties in with Information Centers

To ensure that computing efforts support rather than sidestep or oppose corporate objectives, decisive action must be taken by corporate management to direct this driving force. Broad strategic corporate objectives should be the basis for strategic MIS and IC objectives which, in turn, dictate operating goals in the form of specific action plans. This effort requires complete cooperation of corporate management, MIS and IC management, and operating or end-user management. In order for these management levels to reap the benefits of information centers as a corporate resource, there is a need for a top-down approach that centers on an integration strategy, especially between the MIS department and the information centers which meet the end-user needs.

MIS and IC Management—Development of a Continual MIS-IC Operating Plan. Completion of the MIS strategic plan marks the beginning of the development of MIS specific operating plans, including the IC's support of end-user organizations. These operating plans must be consistent with the MIS strategic plan in the same way that the MIS strategic plan is consistent with the corporate strategic plan. To reiterate, this is a top-down approach, designed to cause the MIS department and, in turn, the information centers to be driven by corporate objectives.

Once the MIS strategic plan has been approved by corporate management, it becomes the responsibility of MIS management to transform the general strategies into specific actions and goals not only for its own

department, but also for the organization's information centers. These specific actions and goals should focus on what can be achieved realistically within some specific time period. This job is most effectively accomplished by preparing an operating plan that incorporates MIS-IC actions and goals and spans a time period typically of from one to three years. This phase requires active participation of the end users to define fully their system requirements in terms of applications development on microcomputers and mainframes, maintenance of hardware, software acquisition, security over microcomputers and mainframes, and so on. The MIS organization must also integrate with these requirements their own activities and goals regarding such strategic issues as methodology, database, hardware configuration, organization, training, productivity, and assimilation of new technology. The combined MIS-IC operating plan should be developed at the proper levels of the organization, where there is a clear understanding of the corporate goals and objectives as well as a firsthand knowledge of data processing issues and technology.

The objectives of the MIS-IC operating plan, with an accent on the information centers, should include the following: (1) ensure consistency of MIS-IC planning with overall corporate business planning, (2) ensure that the information centers understand and fully satisfy end-user requirements, (3) increase end-user and IC management visibility to MIS activities, (4) improve the formal communication and reporting mechanisms between the information centers and the user organizations, (5) ensure effective utilization of IC resources, human and technical, and (6) provide a mechanism for forecasting hardware, software, personnel, and capital requirements.

The content and organization of the combined MIS-IC operating plan should include those factors that center on changes in the type of company business (new services or products), technological advances, changes or growth in external organizations, manpower availability, and changes in the company's economic situation. All these and other pertinent factors must be considered. This background information establishes the starting point and the environment in which planning can take place in the future.

The most convenient format for this information is an action plan that lists each goal, its related activities and milestones, a proposed timetable, and a responsible person or organization unit. Once formulated, the operating plan should be double-checked for consistency with the corporate strategic plans. It should then receive the full approval and support of corporate, MIS-IC, and end-user management to ensure a concerted effort to achieve the goals. Once approved, it is, in essence, a contract. To begin executing the contract, MIS-IC management must now move on to the development or extraction of a one-year operating budget from the first year of the operating plan not only for the MIS department, but also for the information centers.

Reporting Mechanism for MIS-IC Operating Plan. An integral part of the top-down approach to the overall planning process is the reporting mechanism that provides feedback to the appropriate management level. Management summary reports should incorporate information about the

progress being made against all MIS plans, the one-year MIS-IC operating plan, and the corporate strategic plan. Provision should be made to adjust the plans to changes in business conditions, and corporate management must assert its leadership to make any organizational changes to ensure that the plans are fully supported and implemented. Overall, a most important item to bear in mind is that this planning process must be adapted to the specific environment. It cannot be considered a static formula, but rather one that evolves as a result of the driving forces of changing markets, corporate goals, technological change, and other such items.

Areas of Concern for Acquiring Microcomputer Systems

Before microcomputer systems can be acquired in an effective manner by end users working with IC professionals, corporate management must give direction to their efforts. More specifically, it must define areas of concern relating to vendors that affect the end-user's department as well as the total corporation. If the microcomputer system does not work or is not suited to the end-user's needs, its failure may prove fatal to the end-user's department or possibly the entire organization. Before purchasing a system, it is always helpful to see the same system in operation at another facility similar to the environment in which it will be run.

Typical Vendor Checklist. Because each user's situation is unique, areas of concern are meant to be no more than general ones. However, they are a means to help end users negotiate with the vendors. A checklist of concerns can be used to question vendors regarding certain aspects of the microcomputer which may be applicable to the end-user's particular needs. A typical checklist for assisting end users in negotiating with vendors that is approved by corporate management is found in Figure 8-3.

Depending upon the type of microcomputer hardware and software required, many of the foregoing vendor areas of concern could involve large amounts of money if the wrong microcomputer system and accompanying software are purchased and installed. Allowing each department carte blanche in choosing its own microcomputer systems is wasteful and expensive and should be avoided at all costs. A major challenge, then, facing today's end users is how to shop in the "microcomputer supermarket" resulting from the proliferation of products and suppliers, and the resultant integration of microcomputers into their departments. For their successful acquisition, corporate management must exert the leadership which takes the form of the vendor checklist found in Figure 8-3.

Methods to Overcome Microcomputer System Incompatibility

Micro-to-micro system incompatibility was not included in the preceding areas of concern as they relate directly to vendors. The rationale is that it is the overriding factor in the acquisition of microcomputer hardware and

Figure 8-3

Typical Vendor Checklist, Approved by Corporate Management, for Assisting End Users in Negotiating with Vendors

- Are any educational courses available for learning how to use the software?
- Are there any special personnel requirements regarding education or minimum intelligence levels?
- What would be the response time or throughput when using the microcomputer system?
- Is the source code in escrow, in case the software house goes bankrupt and access to the source code is needed?
- Is the software documentation that is provided user friendly?
- Are there any special environmental or electrical requirements?
- Are there any custom software requirements, i.e., what about the costs and requirements of any custom software programming that may be necessary?
- What is the proposed method of payment (such as one-third upon signing, one-third upon installation, and one-third upon acceptance)?
- Who will have ultimate vendor responsibility when both the software house and the hardware house point to each other as the source of a system problem?
- Is there a maintenance program that begins after the end of the warranty period?
- Are there any compatibility guarantees that the software will work with the hardware and other software?
- If field modifications are needed, what will be the cost?
- Is a list of suppliers provided, along with a secondary source of supply, in the event that the original supplier is not available?
- Before purchase of the software, are there any test packages available for the computer system currently in use ("demo" software)?
- Will credits be given for malfunction of the system?
- Is there a possibility of having acceptance tests?

software. Due to its importance, it is treated separately not only from the standpoint of developing a policy on the micro-to-micro communication in the corporation, but also in terms of methods to resolve this problem which is a constant source of computer conflict.

A policy from corporate management in terms of microcomputers to acquire must be supplemented by one that relates to the micro-communications issue. In effect, the corporate manager is typically faced with the need to look at both sides of the microcomputer coin, i.e., micro acquisition and the desire to communicate among the micros now or sometime in the future. It is far better to address these issues and resolve them with the issuance of a single policy rather than with two policies

issued at different times which may lack consistency. To understand the need to issue one comprehensive policy, uncontrolled microcomputers allow end users to become attached to their first systems, thereby making it very difficult to move them to new hardware and software as it becomes available. "Guerilla warfare" tends to occur when end users see IC professionals as too intransigent and impose their own "de facto Declaration of Independence."

Although a typical policy regarding microcomputers and their properties is given in the next chapter, it is sufficient to say that it is better for corporate management to have a policy rather than to have none at all. In turn, it should be reviewed periodically. Corporate management must lead and not follow in this important area. Typical methods that can be used to develop a policy are given below.

Methods of Micro-to-Micro Compatibility. There are several approaches for corporate management to follow in regard to a corporation-wide policy. Linking the systems together through a local area network offers one solution to the challenge of sharing data between incompatible systems. For example, Nestar Systems, Inc. (a Palo Alto, California, firm) has designed systems that allow users to share the data generated by different microcomputers, even though their operating systems and file formats are incompatible. With the capability to share data files (especially in an office where users have developed preferences for different micro systems), one user working on a financial spreadsheet at an Apple might want someone sitting at an IBM PC to take a look at it. An Apple Lotus 1-2-3 file stored on Nestar's system is accessible to the IBM users through the network's shared disk. Overall, the network is useful for this purpose. Local area networks are typically bought so that end users can share software, storage devices, and printers—not to exchange data between different systems.

Another way to get around the problem in the future is to have corporate management follow a policy advocated by some computer experts. These experts believe that communications problems between dissimilar microcomputers will command even less attention in the future as organizations standardize on one system. Although micro-to-micro communication is definitely a problem now, it is not expected to be in the years ahead when fewer organizations own incompatible microcomputers. Rather than trying to figure out how to make them talk to one another, companies are phasing out dissimilar systems and standardizing on IBM, Apple, or DEC.

Micro-Mainframe Link for Data Compatibility

Going a step beyond the micro-to-micro communications problems, an even larger problem faces the use of computerized information systems. Essentially, it centers on the microcomputer-to-mainframe link and vice

versa for data compatibility. Despite the fact that micro-mainframe technologies are still in their infancy, making it difficult to estimate the benefits of the technology, a corporate policy that is effectively implemented can avoid numerous pitfalls. These problems include planning mismatches between separate departments, frustration from end users caused by the lack of leadership on this issue, the risk of loss of control and security, and the possibility of delaying the benefits that micro-mainframe links can bring.

To be effective, a micro-mainframe policy must match overall business objectives and strategies with policies for MIS, telecommunications, and office automation, including information centers. One sign of a poor micro-mainframe policy is one that is the same for any organization. Different organizations have found completely different uses based on their business objectives and strategies. Hence, a sound micro-mainframe link policy needs to be articulated as a means of integrating the interests of IC professionals and end users. As will be obvious from the possible connections below, interaction between both groups will be necessary in order to find one or more ways to connect the two for the best results. No one is best for all situations; the attendant circumstances must be surveyed.

Micro-Mainframe Connections Today and Tomorrow. Micro-mainframe connections which currently fall into several categories include: (1) the microcomputer is used as a terminal itself in order to eliminate the need for a separate terminal at the end user's desk, (2) the microcomputer uses emulation, which allows transfer and receipt of data with the mainframe in the same data format, (3) the data are downloaded in which the data from the mainframe become a file stored locally on a microcomputer, or the data are uploaded in which the data from a microcomputer file become input for the mainframe, (4) the information is downloaded or uploaded in which files are structured and formatted for a specific purpose, and (5) active information extraction is employed in which the software on both the mainframe and microcomputers allows the user to select the desired data. These connections represent the leading and most common kinds of micro-mainframe interaction. Other types will also occur.

Other areas of future activity include (1) downloading and uploading various types of models, such as PERT/Critical Path Analysis and linear programming, (2) use of electronic mail to save a lot of "telephone tag" time, as mainframes provide a convenient store-and-forward facility, (3) use of mainframes for data sharing where distributed database technology is employed, and (4) access to expensive peripherals where micros need to use these from time to time.

The foregoing links between microcomputers and computer mainframes are a study unto themselves. This overview mentions only the more popular ones. Others are available. At a minimum, corporate management should be aware of these micro-mainframe connections.

Integration of Corporate Databases between Mainframe and Microcomputers

The prior micro-to-mainframe link is further complicated by the need to get at data stored at the mainframe site in the corporate database. A corporate database is a collection of data logically organized to meet the information needs and time constraints of the entire organization. Although the cost of processing power is getting lower all the time, the same cannot be said about the data. For the most part, it is the IC professional's job to design, develop, maintain, and guard the organization's corporate database when it is utilized by end users. There are still applications that have to be built around data that come in from different sources that have to be filtered and quality checked and stored in one place. In turn, microcomputer applications must be able to feed off this database.

To enable all of the micros to make use of the organization's database, the MIS department should also be charged with creating the necessary telecommunications links. It follows from this that the information centers must be given some regulatory or standard-setting authority over which micros it will support. Although the capabilities to standardize around a single brand of microcomputers may be feasible in the future, generally it is not feasible currently. It is recommended that IC management work with the MIS department to set up its database and communications network in order to support at least three machines. This approach gives end users some freedom of choice without burdening the information centers with monumental compatibility headaches. Thus, the ideal integration of micros and corporate databases is achieved when micro end users defer to corporate management via the MIS departments and information centers' fundamental policy-making authority. In turn, the MIS department and information centers permit end users maximum freedom to implement policy and to draw on the corporate databases according to their individual needs.

Use of Database Management System by Information Centers. The successful integration of the corporate databases with micro end users or, for that matter, the development by end users of their own databases centers on the use of a database management system. Training in DBMS is generally offered by information centers, where the management of data is seen as its central function. The DBMS is capable not only of servicing end users via ad hoc queries directly, but also of servicing their specialized analytical needs.

The most critical feature of an information center DBMS is an easy to learn, concise, ad hoc query command language, which must deliver consistent results regardless of the database design. The database structure must be transparent to the end user. The language should have few command words, and the user should receive clear, well-formatted output. The same command language must enable the end user to save the results of the query from the corporate database as a personal database for further subset problem analysis. In summary, to integrate the microcomputer user to the computer mainframe, the microcomputer DBMS must function identically in a

stand-alone or in a mainframe-connected mode to process and provide data to the end user.

For end users of specialized financial or statistical software, the role of the DBMS is different. The DBMS either provides those capabilities through its single command language or, transparent to the user, provides data load and refresh services through the analytical database of a separate package. At any rate, the end user need learn only one command language for integration of corporate or microcomputer databases.

Establishment of Responsibility and Control over Microcomputers

Just as corporate management is involved in a corporation-wide strategy for the planning and organization of microcomputers as well as information centers, the same must also be said in terms of responsibility and control over microcomputer hardware and software. Responsibility for establishing control over microcomputers must begin with corporate management. They must take a broad perspective of information centers and, more importantly, of the end-user departments. Corporate managers must understand the prevailing attitudes of those inside and outside of the information centers. This knowledge will be helpful in determining the direction necessary for responsibility and control over microcomputers.

Because corporate management has and continues to encourage end users in the process of office mechanization using micros and to increase their resources to do a bigger and better job, it must now ensure that the whole area of information processing is controlled within the organization. As demonstrated before in the chapter, organizations have recognized that it is necessary to set up information centers so that end users can have access to microcomputer hardware and software. Also, some organizations have found the need for a micro-mainframe link to allow access to the corporate database. As time goes on, additional demands will be placed on the information centers as well as on the MIS department.

In order to reap the benefits of microcomputer processing today and in the future, corporate management must define overall objectives for control of these systems. Typical control objectives can be stated as follows: (1) to prevent the redundancy of MIS processes and applications with those of microcomputer systems, (2) to avoid the incompatibility of microcomputer hardware and software, (3) to deal with the tendency of end users to break ties with the information centers, and (4) to plan for the possibility of applications going seriously awry due to inexperienced and ineffective methodologies by end users. As each end-user department discovers that it can accomplish great things by computerizing its work, corporate management must be alert to maintaining control over the microcomputers. Certain signals that may indicate control is being lost must be recognized. This is particularly true in terms of control over accounting and financial data.

Checklist for Assessing Control over Microcomputers. Because the use of microcomputers to process accounting and financial information tends to increase the need for accountability and responsibility which were not necessary when the data were processed manually, corporate management must direct that greater attention to controls be assessed in these critical areas. Without adequate controls over hardware, software, and information processing, a microcomputer-based system may create more problems than it solves. These problems are set forth in Figure 8-4.

The message from the foregoing listing of controls is that corporate management must initiate the action in this important area and make it an integral part of the MIS corporate strategic plan mentioned previously. In effect, corporate management must develop a strategy for implementing

Figure 8-4

Checklist for Assuring Adequate Control over Microcomputers

- *Assess how the microcomputers are to be used.* Design an appropriate control framework before the system is installed.
- *Separate responsibilities.* Dividing responsibilities among different people—software custodians, operators/users, those who prepare documents for processing, and those who review output for completeness and accuracy, for example—usually improves processing accuracy and provides a line of defense against misuse of the system.
- *Ensure that information is processed correctly.* To be sure that the programs will do what they are supposed to do, have them tested before they are implemented. Also, since it is usually necessary to test the output, it should be printed in a form that can be reviewed readily.
- *Develop operating procedures for end users to follow.* To make sure that users understand how to operate the system correctly, provide written instructions for the microcomputer's use; policies concerning the use, retention, and storage of software; and special procedures relating to scheduling use of the system. Then offer training programs to teach users the operating procedures and give them hands-on experience with the system.
- *Provide for the physical protection of the hardware.* Place the microcomputers in a secure location where access to them can be controlled. Also, provide for reasonably stable environmental conditions—free from excessive dust, smoke, and temperature extremes.
- *Protect the software investment.* Duplicate data files and programs on backup diskettes or purchase backup programs from vendors. Store software in one place and assign someone to log it in and distribute it as needed. If possible, store backup software in a different location.
- *Plan for contingencies.* Will an interruption or temporary breakdown in processing create major problems? It may be necessary to have a backup system on site or to have an arrangement to borrow equipment from hardware vendors.

controls throughout the organization. If corporate management does not give direction early in the game for this important area, periodic crises with microcomputers may be the order of the day rather than a rare exception.

Although the foregoing aspects focus on the technical aspects of responsibility and control over microcomputers, corporate management must not forget the human element. As one consultant commented on organizations which were being run by "technology and technocrats": "I see an awful lot of people saying they are right. Too much is technology driven. The human side really drives it, not technology." In actuality, what makes the world work is accountability and responsibility of the individual. She went on to say: "If you want an end user to be a part of it [the system], you have to give the user ownership and let the individual participate." Overall, the corporate managers must have a goal to develop a partnership between IC professionals and end users that results in responsibility and effective control over microcomputers. Lack of a corporate management goal in this area may have far-reaching effects over the long run.

Establishment of Standards for Microcomputer Security

Closely related to establishing responsibility and control over microcomputers is the establishment of standards over micros. As with the previous methods for integrating interests of IC professionals and end users, corporate management must take the lead in this area. More specifically, it is essential that microcomputer standards be an integral part of information centers. With a mandate by corporate management, information center managers need to develop standards by which microcomputers are purchased and used. These standards, if handled appropriately, will be perceived by end users as a way of improving their departmental workload.

On the other hand, the risks are equally clear. If end users ignore the need for standards, a "Tower of Babel" will develop with limited (or no) ability for end users to deal with each other's data and applications. At this point, the information centers will probably take a considerable amount of heat for letting the organization get in this situation. As an example, a corporation needs to centralize the information end users are using on their micros. Otherwise, there can be a dozen different answers from the same data. In turn, this problem is further complicated when the micros are integrated with the corporate mainframe.

Essentials of a Microcomputer Security Program. According to a recent Newton-Evans Research Company's (NERC) survey on microcomputer usage trends in Fortune 1000 corporations, the most frequently cited response was the fear of privacy and security violations or other related abuses being made easier with microcomputers. It is a concern that appears to be growing at these corporations. The message is obvious for corporate management: microcomputer security is mandatory.

The *first* task of a microcomputer security program is to define the data. By defining the data, it forces corporate management along with MIS

management to ask two questions: "What would it cost us to lose that data? How would our business be affected if we walked in one morning and found our data erased or stolen?" At this point, management might convince themselves that their data would not be stolen because the data has no interest for anyone outside their organization even though they might classify the data as highly specialized and unique to their industry. But they would be overlooking one source who will always be interested: the competition.

The *second* task of a microcomputer security program is to limit exposure both from malicious insiders who might want to compromise the system and from unauthorized outsiders who might access the computer by randomly dialing in. The microcomputer system must be made accessible only to authorized users. Furthermore, security must be able to prevent the theft of microcomputers from the office.

The *third* task in a security program is to provide auditability so that the organization can further determine where and what its security risks are. Until a microcomputer system has audit controls, there is almost no way of knowing if illegal tampering is occurring.

UTILIZATION OF MANAGEMENT GUIDELINES FOR INTEGRATING INTERESTS OF IC PROFESSIONALS AND END USERS

Because the onslaught of micro computing is a fact of life, it is important that corporate management not resist this evolution in computing. They should, instead, take the lead, maintain a positive attitude, and provide the proper environment for success. In this manner, the spread of micros can be accomplished in a productive manner. Inasmuch as employees usually do what they are taught, enforcement will not be as effective as leadership. This has been the main thrust of the foregoing corporate management guidelines for integrating the interests of IC professionals and end users.

Two examples should clarify the different approaches to integrating the interests of IC professionals and end users. An electric utility company's MIS management tried to suppress the introduction of microcomputers, even going so far as to enlist the support of its own systems professionals. When the microcomputers appeared anyway, attempts were made to rigidly control their use. The result has been incompatible equipment and a total lack of coordination and control. In contrast, one of the largest law firms in the country eagerly accepted their attorney's interest in micros by setting up an information center. The center, with the blessing of the managing partners, went out of its way to meet with the attorneys and evaluate potential microcomputer applications. This approach has led to an effective control structure that will become this firm's standard. The attorneys, accepting their lesser understanding of the problems, send all potential software applications to the information center for evaluation. IC

professionals are then able to decide whether the software will satisfy the requirements and, if so, how to best implement it throughout the firm and train users. If the software is not satisfactory, alternatives are researched, or custom software is developed.

Although these two examples exemplify the do's and don'ts of integrating the interests of IC professionals and end users, the emphasis is placed on utilizing an effective strategy. Fundamentally, this approach was taken in the eight guidelines. In addition, other guidelines that assist in integrating the interests of the two groups will be given in the remaining chapters of the text, that is, management guidelines for IC professionals, in Chapter 9, and for end users, in Chapter 10. Essentially, these guidelines will highlight how to handle day-to-day microcomputer problems and how to solve them.

CHAPTER SUMMARY

Because microcomputers have replaced many tedious and labor-intensive computations and tasks, their popularity and utilization for on-the-job personal computing will continue and will provide a number of short-term to long-term benefits for the typical organization. With this as a background, corporate management must assume a *leadership* role for the overall direction of microcomputing in the organization. This is even more valid if the organization's information centers have not developed strong relationships with end users. The way in which corporate management assumes a leadership position will determine the success or failure of integrating the interests of IC professionals and end users. Thus, the chapter stressed that a strategy—stated in the form of eight guidelines—be developed by corporate management to provide strong support and leadership for end users. Failure to develop an appropriate strategy may result in the risk of losing the end users as permanent allies.

NOTE

1. Martin Lasden, "Working out a Winning Strategy," *Computer Decisions* (March 15, 1984): 54.

SELECTED REFERENCES

- Allen, R. J., "PCs with the Right Connection," *Modern Office Technology*, July 1985
- Beach, L., "The Micro-Mainframe Connection," *Information Management*, July 1984
- Beaver, J. E., "Promoting Personal Computing," *Computer Decisions*, March 15, 1984
- Beck, A., and E. Hillman, "What Managers Can Do to Turn around Negative Attitudes in an Organization," *Management Review*, January 1984

- Brown, G. D., and D. H. Sefton, "The Micro vs. the Applications Logjam," *Datamation*, January 1984
- Brown, S., "Presto, Mainframe Computing Gets Personal," *Computer Decisions*, June 1984
- Buss, M. D. J., and L. M. Salerno, "Common Sense and Computer Security," *Harvard Business Review*, March-April 1984
- Cook, R., "Alternative Avenues to Personal Computing," *Computer Decisions*, March 15, 1984
- Dooley, B., "Information Centers on Rise," *Management Information Systems Week*, June 6, 1984
- Eaton, T., "Defining the Personal Computer Explosion," *Infosystems*, August 1984
- Egan, M., "Firestone: Implementing a Micro Strategy," *Micro Manager*, April 1984
- , "Study: Micro Privacy a Worry," *Management Information Systems Week*, April 18, 1984
- Engstrom, T. M., "The Micro Marshall Hits Town," *Datamation*, April 1, 1984
- Feretic, E., and T. Moran, "Forum, Executive Support: A Delicate Balance," *Today's Office*, June 1984
- Freedman, D. H., "Is the Micro-Mainframe Link Connecting with MIS?," *Infosystems*, February 1984
- Gebremedhin, E., "Users to Mainframes: You Must Do Better!," *Computer Decisions*, December 1984
- Gilliam, L., "Ten Tips for the Frustrated MIS Manager," *Computerworld*, August 29, 1983
- Good, P., "How to Make It a Success, Micro/Mainframe Marriage," *Business Software Review*, September 1986
- Greenberg, E. R., "What Drives IC Growth?," *Information Center*, July 1986
- Guerin, F. W., "Information Center: Support for Micro Policy," *Computerworld*, September 26, 1983
- Gullo, K., "Toward the Perfect Interface," *Computer Decisions*, March 12, 1985
- Harty, P., "Managing Those Multiplying Micros," *Software News*, July 1984
- Horwitt, E., "New Solutions to the Micro-to-Mainframe Puzzle," *Business Computer Systems*, April 1985
- Hughes, G. M. K., "Formulating a Micro Policy for Your Company," *Computerworld*, September 26, 1983
- Kull, D., "Does the Heavy Hand Defeat Itself?," *Computer Decisions*, March 15, 1984
- , "Protecting Information Resources," *Computer Decisions*, September 1984
- Lasden, M., "Working out a Winning Strategy," *Computer Decisions*, March 15, 1984
- Liggett, R., "Info Resource Management Aids Data Security," *Computerworld*, April 30, 1984
- McKibbin, W., "The Micro Challenge to Data Security," *Infosystems*, April 1984
- Millar, V., "Decision-Oriented Information," *Datamation*, January 1984
- Miller, F. W., "Develop a Partnership with Your Users," *Infosystems*, December 1983
- Mills, C., "The Construction of an Information Center," *Computerworld*, November 30, 1983
- Murray, J. R., "Develop Your Information Center in Phases," *Computerworld*, February 27, 1984

- Pascale, R. "Fitting New Employees into the Company Culture," *Fortune*, May 28, 1984
- Peters, T. J., and R. H. Waterman, Jr., "What Makes a Company Excellent?," *Modern Office Technology*, January 1984
- Rauzino, V., "Tying the Micro-Mainframe Knot," *Datamation*, July 15, 1984
- Reilly, D., "Info Center Requires Careful Planning," *Computerworld*, August 22, 1983
- Richardson, M. J., "Marketing the Information Center," *Computerworld*, September 19, 1983
- Roman, D., "The Evolution of Micro-Host Links," *Computer Decisions*, September 10, 1985
- , "Micro-Mainframe Links the Chain of Demand," *Computer Decisions*, January 28, 1986
- Schindele, D. D., "Lack of Control of Micro DP Leads to Chaos," *Computerworld*, April 30, 1984
- Shein, S. S., "De Facto Standard Propels Micros," *Computerworld*, October 10, 1983
- Steinbrecher, D., "Breaking Down the Micro-to-Mainframe Barrier," *Today's Office*, January 1987
- Sullivan, K., "Keeping the PC under Lock & Key," *Micro Manager*, April 1984
- Sumner, M., "Organization and Management of the Information Center," *Journal of Systems Management*, November 1985
- Uttal, B., "Linking Computers to Help Managers Manage," *Fortune*, December 26, 1983
- Watt, P., "Micro-Mainframe Links Dominate Info Center Conference," *Computerworld*, August 4, 1986
- Youmans, M., "The First Step in Micro-Mainframe Integration," *Information Center*, June 1985

9

MANAGEMENT GUIDELINES FOR INFORMATION CENTER PROFESSIONALS

ISSUES RAISED AND EXPLORED

- To explore the need for management guidelines to oversee IC professionals.
- To discuss the establishment of an information center steering committee.
- To set forth desirable attributes of a competent information center manager.
- To present appropriate management guidelines that are related directly to IC professionals.
- To examine the relationship of management guidelines for IC professionals to interface with end users.

OUTLINE

Introduction to Management Guidelines for Information Center Professionals

Need of Management Guidelines for IC Professionals

Management of IC Professionals by MIS Department

Establishment of an Information Center Steering Committee

Members of an Information Center Steering Committee

Selection of Competent Information Center Managers

Duties of an IC Manager

Professionalism of an IC Manager

Eight Management Guidelines Related to IC Professionals

- Utilization of a Proactive Approach That Is Related to a Stated Micro Policy
- Involvement in Acquiring Appropriate Computer Hardware and Software
- Assignment of Responsibility for the Information Center Support Services and Maintenance
- Acting As Knowledgeable Consultants to End Users
- Provision of Desired Training for End Users
- Improvement of the Communication Process with End Users
- Establishment of an Effective End-User Group with Periodic Meetings
- Establishment of Control over End-User Computing

Relationship of Management Guidelines for IC Professionals to End Users

Chapter Summary

Note

Selected References

INTRODUCTION TO MANAGEMENT GUIDELINES FOR INFORMATION CENTER PROFESSIONALS

As noted in the previous chapters, the integration of IC professionals and end-users interests by corporate management is a beginning point for managing information centers effectively. In order to translate the integration of interests to a practical level, the focus of this chapter is on the establishment of appropriate management guidelines for IC professionals. (In Chapter 10, the focus is on appropriate guidelines to aid end users.) From this viewpoint, IC professionals have a responsibility to do whatever is required to build and maintain a stable operating environment. Any quick-fix effort that jeopardizes the stability of the IC operating environment must be resisted. Well-managed information centers, which are staffed by qualified IC professionals, then, are a necessary prerequisite to meet end-user computing needs.

NEED OF MANAGEMENT GUIDELINES FOR IC PROFESSIONALS

Although corporate management guidelines useful for integrating the interests of IC professionals and end users were explored in some depth in Chapter 8, there is still a need to translate them into practical guidelines for IC professionals to follow on an everyday basis. These guidelines may not cover every possible contingency; however, they do cover the major problems that should be addressed. As a way of ensuring that these everyday guidelines are utilized properly, the material below presents a balanced perspective, that is, IC professionals are related to the MIS department first and then to end users.

Management of IC Professionals by MIS Department

A recurring theme throughout this book is that the advent and proliferation of microcomputers, the introduction of information centers, and the use of fourth-generation programming languages have not only provided the opportunity to move many of the more mundane aspects of information processing out to the end users, but also have brought about in the minds of some corporate managers a perception that a great deal of the MIS effort can be carried on in a much more immediate, quick-fix mode. The ease with which much of this routine work can be accomplished by end users with very limited information processing experience or training, where the processes have been correctly installed, helps to change the organization's information processing climate.

Given the relative ease with which end users can obtain answers, it seems logical to those looking in from outside that an MIS department's importance is overstated. The result of such a superficial conclusion, particularly where end users have realized major successes on their own, is to mount a campaign to circumvent the MIS department and its bureaucracy. In this situation, MIS sees a growing effort to forget about the unnecessary overhead of the traditional approach to implementing new management information systems and to push ahead to get the job done. Although there is some validity in adopting such a position, the changed MIS department that results from the effective delivery of the appropriate end-user information processing does lend itself, for a given type of work, to more free, more immediate MIS methods. However, a critical factor is the identification of projects that fit the more immediate methods.

To a great extent, the MIS department that has done its job and achieved its goal of providing a truly effective information processing environment for end users becomes a victim of that success. Aggressive users will push hard to go their own way. In this environment, MIS management must continue to encourage end users in the pursuit of their particular goals where practical, yet at the same time retain proper control within the realm of large-scale MIS projects. In such a circumstance, there is, more than ever, a real need for the MIS department to maintain appropriate control for those areas in which it has ultimate responsibility. In certain situations, for instance, where the end users are doing their own work with relatively simple information processing systems and noncomplex programming, this may not be necessary. On the other hand, this is not the case with large-scale MIS projects, whether they are new systems or enhancements to existing systems or are purchased or developed in-house.

As IC professionals work hard to become increasingly responsive to end users and to allow users to manage their own particular information processing needs more easily, they must resist the pressure to weaken their own proven MIS techniques. Clearly, MIS has a responsibility to the organization to do whatever is required to build and maintain a stable

operating environment via information centers. A balance must be struck between the need to accommodate the desires of end users and the need to protect the MIS department. Wherever the push to move to a quick-fix effort jeopardizes the stability of the MIS operating environment, that effort must be resisted by the MIS department. It is not easy to implement—it tends to irritate end users and corporate management—but it is right and it must be done. The line between MIS control and chaos is, as many organizations have found much to their sorrow, very thin indeed. The inappropriate adoption of quick-fix techniques can very easily push the MIS department over the line from control to chaos.

ESTABLISHMENT OF AN INFORMATION CENTER STEERING COMMITTEE

Inasmuch as the time has come for IC professionals to find out what end users do and how they do it, it is necessary to meet with them on their terms and listen carefully to their concerns. IC professionals must make a concerted effort to be understanding and knowledgeable about the business and to speak the same language as the end users. They must be equal partners and give up the reclusiveness of the "high priests" of computer technology. How can this be done? The management of the MIS department in conjunction with IC managers must exert the leadership to establish an information center steering committee. Such a committee is responsible for an integrated corporate computing environment. The chief goals will be the leveraging of information resources and the preparation of an information center strategic plan that supports the organization's plans and direction. This committee will deliver a usable plan that allows direct access to integrated data, in English, on line, with improved communication, with "what if" capability at a fair cost, and in a timely manner. This means that IC professionals, in partnership with corporate management and MIS management, must recognize the MIS function to reflect its changing environment.

In the long term, the information center steering committee is to evaluate equipment and future end-user requests for microcomputers, attempt to set priorities or identify needs, and ensure that micros supplement the existing computer resources and do not infringe upon traditional MIS activities. The committee gives credibility to hardware and software tests by setting procedures. Also, it provides the foundation for a potential broader scale introduction of microcomputers.

Members of an Information Center Steering Committee

Because an information center steering committee is a valuable planning and control mechanism over microcomputers, it should represent a wide constituency of organizational employees. Generally, this group consists of

selected end users, senior MIS and IC professionals, and corporate management. These individuals establish mechanisms for planning, measuring, and reporting progress over microcomputers throughout the organization. In turn, they become the driving force for introducing microcomputers in a positive way throughout the organization in order to eliminate or, at least, reduce computer conflict.

To help the information center steering committee in reaching its goals and other stated endeavors, it is recommended that, in addition to publicizing its members, an in-house microcomputer IC newsletter be published periodically. In-house newsletters are usually put together by the information center managers, with the help of some of the organization's end-user enthusiasts. Styles can range from patchwork photocopy to corporate slick. Comments differ too—one might start at the beginning by asking, "What is a microcomputer, anyway?"; another, at the intermediate level by reporting on whether "all floppy disks are created equal." Also, many newsletters feature advice columnists. "My Apple IIe sometimes give me I/O Error messages for no apparent reasons," writes one frustrated user/student. The columnist's advice is to overcome the Apple's moodiness by stripping it down and getting to the essentials of the problem.

SELECTION OF COMPETENT INFORMATION CENTER MANAGERS

An effective strategy to overcome the chaos caused by the introduction of microcomputers throughout the organization is to place competent professionals in charge of the information centers. Such hirees are a new and disparate breed. Title and responsibilities vary widely. Most often, the information center managers are hired by, and report to, the MIS department. Where this is not the case, there may be a certain amount of friction with that department. The information center goal usually is simply stated—"to have somebody control the micros"—but the form the control takes depends on the culture of the organization and the mandate of the IC managers.

Most IC managers seem to have been appointed in response to events rather than in anticipation of them. A few years ago, the executives at a large brokerage firm suspected that there was a groundswell of interest in microcomputers among their brokers in the field. The data communications department was being bombarded with questions about micros. Many of the brokers were charging ahead, buying their own micros and then asking corporate headquarters for advice and support. Some of the firm's top producers reported spending 200 hours becoming familiar with their micros before making a purchase decision.

There was no way to measure the depth of interest until one individual was hired to head a new department called Advanced Technology. The new IC manager decided that his first task should be to send out a discrete

questionnaire to the firm's branch managers: "Would you like to own a microcomputer?" He was astounded by the reaction that he got. The demand for microcomputers, which had been simmering for months, suddenly mushroomed. He did not send the survey directly to the firm's brokers because he was afraid of generating too much interest in micros. As it happened, however, the firm's brokers found out about it, and, when they organized a discount buying program, several hundred brokers ordered IBM PCs. By early in the next year, orders were pouring in at the rate of three a day, with as many as twenty orders waiting on the IC manager's desk on some Monday mornings, and the information center was getting as many as 125 calls a day from users needing support. This level of response is far from unique. Other organizations have experienced similar situations.

Duties of an IC Manager

With this brief introduction to IC management, it would be helpful to look at the duties of a typical information center manager. Such a person should be able to answer questions from end users as well as would-be end users. Similarly, the individual should be able to separate the fly-by-night vendors from the reliable ones and write a strategy and policy for short- to long-range integration of microcomputers with organization-wide management information systems. In addition, the IC manager should be able to recommend hardware and software, prepare training materials and other aids for end users, and cope with the politics that accompany the micro revolution. In essence, the job entails a wide range of duties, one reason for information center managers coming from all walks of life, including MIS, consulting, engineering, and business.

Currently, MIS departments often do not know what qualifications they seek when hiring information system managers. Often, they specify three or four years of experience, but experience in what? Traditional MIS experience would be helpful, but ultimately the job might not fit into the traditional MIS department. For instance, Mr. Jonathan Copulsky was until recently manager of information services at Time Inc.'s corporate manufacturing and distribution division.¹ With a background in financial planning, he was first hired by Time to work in the controller's office. Copulsky reported to the director of finance and administration for the division, but he worked closely with managers on all facets of their information needs, often coordinating with MIS on projects. His duties were myriad: editing a microcomputer newsletter; working with MIS in planning and implementing all systems in his division, from mainframes to micros; and helping to train and support people who use terminals and stand-alone computers.

Recently, Copulski used Lotus 1-2-3 to replace the division's budget and estimating system. A PCOX package enables budgeters to move data

between micro and mainframe. Copulski estimates that the new system can save Time Inc., about a quarter of a million dollars in annual time-sharing costs. He was recently promoted to the position of director of business technology where he advises Time Inc.'s magazine group on the management of information resources and continues to work with micro users. An MBA from Stanford University, Copulsky came to the job without formal technical training. In fact, most IC managers say that although an MIS background is useful, it is not necessary. What does seem necessary is the ability to keep one's head when all others are losing theirs.

Professionalism of an IC Manager

To keep abreast of the direction to take in his or her own information center, the IC manager needs some help. The typical manager who has been recently assigned the formidable task of heading all the organization's microcomputer activities needs to interact with end users by meeting regularly and by discussing their common problems and interests. One such association currently in place addresses the perplexing question of how to integrate microcomputers into an existing MIS department. Known as the Microcomputer Managers Association (MMA), the group enables its members to meet formally once a month and swap "war stories" about their personal experiences in implementing micros in both large and small businesses.

The aim of such an information exchange is to help attendees solve their job-related problems by providing them with practical tips about which microcomputer software tools work and which do not. There is probably no other more effective way to make contact with other information center managers. Within this structure, the IC managers are able to interact with their peers and find out how they are handling maintenance, networking, and so on. Membership in the organization is open to any microcomputer manager whose job responsibility is to define policies, procedures, and guidelines governing the in-house use of microcomputers.

EIGHT MANAGEMENT GUIDELINES RELATED TO IC PROFESSIONALS

The previous sections of the chapter have set the stage for management guidelines to assist IC professionals. In the material to follow, they are developed in some depth so that corporate managers have a real feel for what areas need to be overseen directly. They include the following:

1. Utilization of a proactive approach that is related to a stated micro policy
2. Involvement in acquiring appropriate computer hardware and software
3. Assignment of responsibility for the information center support services and maintenance

4. Acting as knowledgeable consultants to end users
5. Provision of desired training for end users
6. Improvement of the communication process with end users
7. Establishment of an effective end-user group with periodic meetings
8. Establishment of control over end-user computing.

These guidelines may not be totally new inasmuch as they have been discussed directly or indirectly previously in this book; however, they are presented here within a microcomputer framework that is not available in any other text to date. Additionally, the guidelines are presented in a logical manner so that the first one should be undertaken before the following ones. In the next chapter, complementary guidelines to these are developed for end users. These two sets of MIS-IC guidelines, then, cover the essential areas that focus on successful microcomputing in organizations today.

Utilization of a Proactive Approach That Is Related to a Stated Micro Policy

Underlying a broad-based approach to microcomputers is making them an integral part of the entire MIS planning process. The planning process has been discussed previously and will not be repeated. However, this process is best accomplished by utilizing a proactive approach rather than a reactive one that is related to a stated micro policy. From this view, IC professionals can assist end users in acquiring appropriate hardware and software to meet their everyday needs.

The Proactive Approach centers on identifying potential problems via the planning process before they occur. Although these problem areas, which are the focus of attention, are covered in some depth in the next sections of this chapter, the accent on solving them should be on practicing management by perception. Fundamentally, this important management principle states that management needs to look into the future, i.e., several years hence, and examine the problems that might impact the organization. Having identified the important ones, these problems should be brought back to the present time and solved. In this manner, the current problems of microcomputers would not be as prominent if they are solved today rather than sometime in the future. Hence, a forward-looking, proactive approach must replace any backward-looking, reactive approach, which utilizes management by exception.

Involvement in Acquiring Appropriate Computer Hardware and Software

An important part of a microcomputer policy is assisting end users to evaluate, acquire, and use micro hardware and software. A starting point

has to be long-term considerations, such as mainframe-to-micro compatibility and local area networks. From this viewpoint, there is a need to tie in the viability of current outlays for micro hardware and software with its future direction. A proactive solution here gives the information centers, working in conjunction with the MIS department, a choice to bring in standardized systems which will integrate easily into its future plans. It solves the problem of supporting micro hardware and software that may not be on the market in the near future.

In addition to putting together micro hardware and software to address long-term considerations, it is necessary to consider the short-term, i.e., the coming year. Primary consideration should be given to controlling costs while allowing end users freedom to do what they want within approved short-term micro hardware and software guidelines. Due to the importance of hardware and software considerations from the IC professional viewpoint, they are discussed separately below.

Microcomputer Hardware. The acquisition of microcomputer hardware in a typical organization involves many considerations. One of these is what types of microcomputers should be acquired as well as how many. As the vice president of a major corporation commented, "I expect that our firm will acquire about a thousand micros over the next three years for some portion of its professional population. This is approximately \$5 million, or the equivalent of two of the largest IBM mainframes on the market currently. I am sure that if the MIS department were to request \$5 million in hardware, this would be scrupulously reviewed." Should micros be any different? From an MIS perspective, cost is a minor problem in comparison with the headache of managing hundreds or thousands of independent processors in order to ensure that they can perform similar tasks with comparable data. In effect, the integration of a large number of microcomputers is half a management problem and half a technical problem, and it involves a long-term commitment by the organization that cannot be bought on the outside.

Another important consideration when acquiring microcomputers is the other side of the cost-benefit equation, namely, the increase in productivity. The typical increase is from 10 to 20 percent when a micro is used to automate a task. One Honeywell study calculates that it is worth investing almost 60 percent of a person's salary in computer support to get a 10-percent increase in productivity. In other words, it is worth providing about \$20,000 worth of computing capability for an employee with an annual salary of \$35,000 if he or she gets just over one hour of more effective work.

In company after company, many IC professionals as well as corporate managers are not aware of the investment being made in microcomputers. For instance, in one division of a major manufacturing company, the information center budget is approximately \$20 million. Managers knew about the proliferation of microcomputers inside the company, but they did not

realize that the small, single expenditures added up to \$15 million annually over the past three years, and that there is a strong likelihood that unmanaged end-user investment and operating expenditures will exceed the central computing resource in two years. They were also unaware of the other costs, namely, the obvious costs of additional storage, printers, and software, and the hidden costs of local area network connection, shared mainframe expenses (including database management systems), and similar items. Thus, there is a multiplier operating when acquiring micros, which can be as high as four; that is, every \$1 spent on acquisition of a microcomputer must be multiplied by four to determine the total cost of acquiring and maintaining micros in a typical organization. Even if hardware prices go down, this multiplier effect will become higher since the obvious costs and hidden costs will stay the same or increase—the trend seems to be toward an increase.

Finally, the key consideration in the micro hardware field is the addition of a communications capability, which removes the main limitations of a stand-alone micro: the lack of access to a data resource and consequent separation of micros from the organization's mainframe computing resource. This independence is unacceptable to many MIS departments. The microcomputer is, in effect, an intelligent terminal which can operate as a self-contained computer or as a terminal linked to a mainframe, information source, or other terminal, as well as a combination of the two. This provides the chief advantages of both mainframes and micros; access to mainframe speed, power, and data; downloading of data to the micro; and the economy of stand-alone micros.

Microcomputer Software. In reference to evaluating, acquiring, and using microcomputer software, the most important step in selecting a software package is to understand how end users will be using it, i.e., to know the applications. The better the IC professionals understand the applications, the better the software choice will be. Thus, it is advisable to list the applications, describe each one, and think about their relative importance. Is one of them sufficiently important to justify a microcomputer all by itself? Which application will be computerized first? How much time will the end user spend every day on each of them? When examining the software packages, concrete examples of usage should be in mind. In this manner, the IC professionals can guide tests and demonstrations. Also, consideration should be given to the types of reports and documents that need to be produced. Last, but not least, the IC professionals should think about the future. How will end-user applications change over the next two or three years?

In all cases, the microcomputer software evaluation should be geared to the situation. If a program will be used only occasionally, hundreds of hours should not be spent in selecting it. On the other hand, if the IC professionals are thinking about buying 100 copies and are entering into an ongoing business relationship with the vendor, that amount of time would

be well spent. Additionally, software should match end-user background and interest in learning. If end users are beginners, a simple but less powerful package might be the best choice. Consideration should be given between the technical background necessary to set up a program for use and the background needed to operate it once it is installed. For example, a complex communications program might be difficult to configure for remote systems but easy to operate once it is set up.

An important software consideration, then, is related to the question: "Will your microcomputer software be ancillary to end users or will it play a central role in your work?" In other words, will the software be used once a month to prepare a sales report or daily to write memos, develop plans, communicate with colleagues, and keep track of personal and company data? Simple, easily learned software packages may suffice for the casual end user, but the serious end user will want relatively comprehensive software that requires more effort to learn. The IC professional should ask how many hours per day the end users will use the microcomputer software and how much time will be required to learn it. Regardless of the software packages the IC professional selects, there is a need to spend time on training, reading, and experimenting (another management guideline to be discussed in a subsequent section of the chapter).

A second consideration is related to the following: "Are you buying one program for the IC professional, i.e., for your own use, or 1,000 copies for use by every middle level manager in your organization?" If buying in volume, there is a need to spend more time and more money in investigating alternatives. Also, it is recommended that the IC professional spend more time with the 1,000 managers who will be using the software than with the potential vendors. The attitudes and desires of the end users should guide the selection, not those of the micro software vendors.

Finally, it is recommended that more than one micro software package be tested. Instead of testing one program in a specific application category, several should be tested to get some perspective. Of course, the IC professional has to balance the amount of effort he or she puts into evaluating programs against the payoff. If word processing is a secondary application, the IC professional should not spend weeks testing every program on the market. Instead, the individual should try out one, read some magazine reviews, and look over a few vendors' brochures. Then the top contenders should be tested and one picked. If well-known programs from reputable vendors are used as a basis for selection, generally one will not get a bad program, even if one does not get the best.

Assignment of Responsibility for the Information Center Support Services and Maintenance

According to some estimates, several million microcomputers will be in place in variously sized organizations by the end of this decade. Imagine

the chaos, not to mention the inconvenience, that might ensue if end users had to rely on local computer retail outlets for guidance, support, and equipment. In an extreme scenario, a potpourri of incompatible and unsupported equipment might spring up in the organization. This potpourri will be spiced with uncontrolled data and heated by the distress of unhappy users who bought inappropriate systems for their needs at the outset. In effect, the net result is "profusion confusion." To avoid this pressing problem, there is a need for micro support services and maintenance, which should be found in effective information centers.

Micro Support Services of Information Centers. As in any department in a typical organization, there is a need to start small to work out the bugs before getting any larger. For example, the First National Bank of Boston selected three service-oriented people out of the MIS department and charged them with the responsibility for maintaining a microcomputer information center that would function like an outside retail operation. The in-house microcomputer store was formed with the idea that there would be a sizable flux of microcomputers into the managerial ranks. Not only did the bank foresee a need for service, sales, training, and support tailored to the organization, but it also envisioned setting up a laboratory, where managers could try out different machines and discover how to use them as business tools.

Currently, at least sixty managers at any given time are making use of the in-house microcomputer store. Users can choose IBM, Apple, TRS-80, or Wang microcomputers if the need is for both personal computing and word processing. Like any outside retailer, the bank works with two or three local distributors who can be counted on for training assistance and software support. The training courses range from beginning lessons on the micros to the use of Lotus 1-2-3 for solving specific departmental problems.

Although most of the PC usage has been by managers trying to do their jobs better, there is now a growing demand to access the corporate database—a development which is going to require tighter security standards. The strategic planning division at First National is already sharing information from the computer mainframe with designated business strategists in the bank to do "what if" budgeting. It is expected that soon more employees will want to access the large data banks via the PC. Typically, the first applications with microcomputers are relatively straightforward, followed by more sophisticated ones. Nevertheless, the responsibility for micro support services still lies with the MIS department.

Micro Maintenance. Going beyond assigning responsibility for micro support services of information centers, there is a need to assign responsibility for micro maintenance. Maintenance can be handled in several ways by the typical organization. Hardware problems are addressed through an agreement with IBM, through local stores, and through several third-party service organizations. In contrast, software problems are channeled through the end-user group, an assemblage still in its infancy (to be

discussed later in the chapter). The situation is further complicated by the many users leasing their equipment; maintenance of the leased systems falls to the vendor. And, of course, the nonstandard users are left to fare on their own.

Maintenance problems stem partly from the fact that the use of micros is burgeoning beyond the organization's ability to control the situation properly. Many organizations are beginning to recognize that micro maintenance is a thorny issue. There are a number of aspects to the problem, not the least of which is the diversity of systems and peripherals to be found in many organizations. A corresponding diversity of service options accompanies them. For example, users of IBM PCs can use the services of IBM on-site technicians or go to a depot service center for repairs; owners of DEC systems are able to use a slightly more generous service plan which includes on-site or depot service for the DEC products and selected peripherals; and owners of Apple microcomputers must either go to their local dealers, who may or may not service correlated peripherals, or secure on-site service through RCA.

Organizations that hope to reduce the number of vendors in the service loop may turn to traditional third-party service contractors, such as TRW's Customer Service Division or Bell & Howell Service Company. The newest layer of the microcomputer service market consists of manufacturing giants, such as RCA, Control Data, Honeywell, Xerox, and General Electric. Currently, some market researchers suspect that the third-party solution may not be simplifying the maintenance problems as much as one might hope. They report that many users complain of being taken advantage of in their dealings with third-party contractors—of being overcharged for labor and having to wait too long for systems to be repaired. Users must weigh these negatives against the positives, i.e., the convenience of single-vendor, on-site service.

In regard to a third-party solution, the information centers should investigate the items listed in Figure 9-1 for any proposed maintenance contract. In addition, a maintenance agreement should provide a means for reporting service history. By utilizing this or a similar problem-tracking system, the service company will be able to analyze the organization's service history and determine factors which can affect the microcomputer's life.

Acting As Knowledgeable Consultants to End Users

Building upon the prior management guidelines, IC professionals should aid end users in acquiring the appropriate micro hardware and software from a positive viewpoint. This centers on advising end users not from an autocratic viewpoint, but from a consultant, i.e., facilitator, viewpoint so that user needs are really met. In essence, IC professionals should become facilitators, not obstacles to end users. They should support the users with

Figure 9-1

Items to Investigate for a Third-Party Microcomputer Maintenance Contract

- The total number of hours the contract covers—inquire about the approximate number of hours the service company anticipates for specific problems.
- Built-in protection from price increases, either in the form of an extension to the agreement or a schedule of anticipated annual increase.
- The service company's guaranteed response time.
- Whether or not the service company will provide units on loan in the event a piece of equipment must, for any reason, be returned to the shop or replaced.
- Whether or not the contract covers routine, periodic preventive maintenance.
- Whether or not the service company's engineers are factory authorized—this is really the only credential that can be checked for assurance that the technicians are knowledgeable in servicing the product lines.

micro software packages and custom programming, if deemed necessary, and train them to get the most out of their micro computers.

Role of Consultant or Facilitator. To assist end users as a facilitator, an IC professional should help users select the best micro hardware for the organization. Why make end users suffer with a variety of keyboards, operating systems, program versions, and so on? Also, the consultants can assist the end users to cost justify their micro hardware. End users with decision-making responsibility should be trusted with such decisions.

When IC professionals act as facilitators, end users will be educated and they will begin to think about micro hardware. For instance, does a particular application really have to be implemented on a computer mainframe, or can the user put the data on a microcomputer? It is necessary to communicate with end users about what a micro can and cannot do—why they must have some level of documentation, why the information centers support certain packages and not others, what help the information centers will give them when they are on their own, why the information centers picked Apple or Tandy or IBM, and why it is important to stick with that kind of microcomputer. Additionally, IC professionals should help end users obtain good prices on equipment.

Extrapolating from the prior discussion, IC professionals in their role as facilitators to micro end users should follow the recommendations set forth in Figure 9-2. Essentially, these recommendations are useful in controlling the microcomputers in a typical organization. Many of these recommendations have been explored previously in the text; however, this listing focuses on assisting IC professionals to act as facilitators, that is, as participants with end users in controlling the spread of microcomputers in a typical organization.

Figure 9-2
Recommendations to Assist IC Professionals to Act As Facilitators in a Typical Organization

- Beat end users to the punch by developing a strategy for implementing microcomputers into the organization.
- Decide what kind of microcomputer systems belong in the organization; generally, there should be about three.
- Help end users acquire those microcomputer systems.
- Place a ceiling on what can be spent for microcomputers by relating this ceiling to a cost/benefit analysis justification approach. If a proposed systems application cost exceeds its benefits, it probably belongs in the MIS department.
- Offer advice in evaluating and selecting a microcomputer system, but leave the actual decision in the end user's hands.
- Provide consultation, problem assistance, training courses, and a normal communication path for dealing with new microcomputer systems.

An integral part of the role of IC professional as a consultant or a facilitator is support for the problem that end users are trying to solve. IC professionals need to interact with end users because users do not really know their needs when they sit down to use the microcomputers. In other words, there has to be someone who can translate the technical language of the MIS department into the financial, legal, or other business language of the end users. This, then, is the role of the IC consultant when acting as a facilitator where the accent is on a service-oriented attitude. Basically, they offer advice about hardware configuration, review software, and help end users to acquire a facility for using microcomputer systems successfully.

Provision of Desired Training for End Users

In the past, most MIS departments shied away from the subject of seriously training end users in areas that must be learned in order to deal effectively with computerized systems. The specific excuses for avoiding the subject were roughly consistent with the technological focus of the times. Also, the technology was deemed by many MIS professionals to be too difficult for end users to understand, so users were rarely brought up to information processing speed and remained in the dark about computer system operations for years. Typically, the MIS department would relegate the responsibility for training to the end users themselves, which is not efficient, to say the least.

Benefits of Information Center Training. Currently, information centers are asserting their responsibility by claiming that microcomputers are wonderful learning vehicles and are so easy to learn. With this view, end users can easily benefit greatly from information centers. Thus, IC

professionals are now seizing the opportunity to supervise ongoing user training—or at least to coordinate it. The rationale is as follows: (1) the information center is the best judge of the knowledge and skills that end users need, (2) control over learning should help ensure that limited funds are used more efficiently, (3) the use of current IC professionals within the information center as instructors should help improve communications with end users, and (4) the training should improve goodwill, an area in which the information center should seek all the help it can get. As noted in Chapter 6, training can come from several directions, in particular, vendor, consultant, and in-house.

Improvement of the Communication Process with End Users

Fulfilling end users' burgeoning information needs can be an elusive quest for most MIS departments because they typically face a mounting applications backlog, increasingly sophisticated and impatient users, a scarcity of skilled professionals, a heavy program maintenance load, and corporate pressure to improve productivity. As noted throughout, a promising solution to these problems—for both the harried IC professionals and the alienated end users—is the information center concept. From most perspectives, it appears that information centers can benefit the entire organization, primarily because, through them, the IC professional–end user relationship can transform into one of cooperation and understanding. In many organizations, however, the current relationship is anything but cooperative. Users perceive the information centers as unresponsive, inflexible, and unable to accommodate their rapidly changing information needs. For their part, IC professionals, including IC managers, often perceive end users as demanding and stubbornly ignorant about just what the information centers can do for them and in what time frame. However, in an atmosphere of cooperation and partnership, the two groups can achieve mutual understanding and, through end-user computing, results. All this is possible if there is an effective communication process between IC professionals and end users.

Improving the Communication Process. Inasmuch as information centers facilitate end-user computing, they embody consultation, education, training, and expertise in assisting end users in do-it-yourself computer applications. The information centers are separated from the traditional nature of the MIS-user interaction. The MIS department need not impose constraints on end users because of its own limitations; instead, the information centers serve to expedite user applications, thus easing the major source of conflict.

The primary objective of establishing information centers—as stated throughout this book—is to enable end users to satisfy their own information processing requirements on their own terms. If the information centers provide the training and consultation necessary for users to attain

confidence and skill in putting their new-found technological tools to use, the prospect of a future harmonious relationship is enhanced. Perhaps the key to such improvement is for end users to learn firsthand what is actually involved in applications development, thus finally confronting—and appreciating—the difficulties faced by the MIS department in any system project. Thus, use of teamwork via an improved communication process that information centers should foster affects the entire organization.

Establishment of an Effective End-User Group with Periodic Meetings

Currently, many progressive IC managers have established end-user groups that typically meet on a periodic basis. These groups focus on three areas: (a) programmer support, (b) standardization, and (c) conflict. In the area of programmer support, IC managers in the past felt that microcomputer users would be hounding them to provide custom programs; however, studies have indicated that micro needs tend to be limited and have been met by packaged software currently available.

The second area of standardization of microcomputers has bothered IC managers from the very beginning because each micro has its own unique operating system and its own variation of BASIC language for programming. Some experts, however, feel that software compatibility is not far away. Some software vendors are beginning to introduce software which they claim enables software programs to be read and executed by any brand of microcomputers.

The third major concern is the *conflict* that comes from control problems over microcomputers. Almost everywhere, IC managers have recognized the need for coming to grips with control over micros. Control, or loss of it, was an early fear; now, it seems that control is being approached in a more positive way. IC managers are still concerned with control over corporate data and their own microcomputer systems responsibility, but control over the bulk of end-user hardware for a typical organization is being left largely to a guiding and friendly hand from the IC professionals in the information centers. The helping hand is expected to be more pronounced in the near future through the interaction with end-user groups.

Benefits of End-User Group Meetings. Although end-user group meetings can focus on any of a variety of subjects, there is generally one overriding reason for their existence. Fundamentally, end users share one of the highest motives for uniting: *enlightenment*. To illustrate this point, a senior methods analyst and others in allied departments (such as public works, budget, and management) are users of a statistical analysis package called SAS (Statistical Analysis System). The information center conducts workshops in entry-level SAS; however, the users wanted more, which resulted in meetings of the end-user group to trade programs and investigate in detail what the software does.

To realize the full benefits of the end-user group, the SAS users designated one person to present a topic at each monthly meeting. This

presenter takes other users through a program line by line after eliminating any confidential data from the listing. Not only do they learn from their colleagues' programs, but also they find out if their own files can benefit another office, which reduces duplication of files. They have developed production systems from these meetings that have saved countless hours of work. It should be noted that these users did not unite because of any information center failing. In fact, the information center was tremendously helpful to them. One might say that "it's a feather in their cap for introducing the SAS language to users."

Other benefits of end-user group meetings include learning the shortcuts to the microcomputer more efficiently. Another is getting to know the people in the organization and having them as a resource for support. As a user group grows and matures and the topics for discussion have been thoroughly examined, other departments and services can be drawn upon for guest speakers and demonstrations.

Another benefit of in-house groups is the increased awareness of what an information center can do. For example, there are several hundred users involved in a company-sponsored microcomputer interest group. Meetings are held for people who have a micro, who are interested in acquiring one, or who just have an interest in what is going on with micros. After six months of attending the meetings, users generally show an improvement in their understanding of the complexities and of some of the problems associated with information processing. Once users get over the fundamental stages of using a micro, they begin to want to try to network and to access mainframe-based information. They start to become acclimated to what is involved in linking a micro to a mainframe and what standards they have to go through to access the database. Understanding the complexities has not decreased micro users' desire to have access to the computer mainframe, but, perhaps, it has increased their patience with the information center.

Referring back to the prior management guideline concerning communication in terms of staying in touch with users, the end-user group can be valuable. This group can be used to pass information down to users as to what is available on the system and to pass information up to the information center as to what it is doing wrong or right and what new products are needed. It is a way of practicing effective upward and downward communications about microcomputer hardware and software. Hence, the more communication there is with end users, the better will be the systems provided for them.

Establishment of Control over End-User Computing

As indicated previously, control over microcomputers must be an integral part of the organization's master plan. Basically, control centers on integrity of the data and their security. Control from this standpoint is

concerned more with end users working off the same set of data. The MIS department must be the keeper of the data and let end users make copies to reformat the data or do whatever else is necessary. Thus, end users have only one place to go for up-to-date data.

When the microcomputer user has finished working with the data, he or she might want to send the resulting calculations and comments back to the computer mainframe for his or her colleagues to see. A number of communications software packages allow users to upload data from the microcomputer to the mainframe. However, there is a difference between uploading data to the mainframe and updating the mainframe's database. Generally, MIS departments emphatically do not want to give users the opportunity to change the corporate database on their own. For this reason, most micro-mainframe products either omit the uploading feature entirely, or only permit users to store data in their own files and mailboxes on the mainframe—which are entirely separate from updating the corporate database.

Microcomputer Security. Microcomputers are virtually devoid of security no matter how it is defined. Anyone may sit in any office and use anyone's microcomputer, and end users themselves may accidentally reformat a hard disk. This lack of security is caused by cost considerations, user ignorance, and the unique nature of the microcomputer itself. In the words of one industry expert, microcomputers which communicate can be "the tools of misuse and the object of misuse." Even microcomputers which do not communicate at all are potential security risks. Thus, chances are very high that casual and not so casual information leaks and losses will occur through an organization's microcomputers.

Security over microcomputers starts with the units themselves. Because there is an active market for stolen micros and their internal components, a first precaution is to report any losses immediately to the information center. Frequently, a part, such as a memory card, will be stolen or borrowed internally, and no one will notice until an application requires the added feature. By reporting such losses to the information center, the organization can be sure that instances of missing boards, or whatever, are investigated instead of a department figuratively shrugging it off and buying another. Microcomputers themselves can be attached to desks. Anchor-Pad makes antitheft kits to fit most popular microcomputers as well as a device which includes an ID card reader to regulate access. Office furniture manufacturers, such as Compucart and Data-MATE, are beginning to offer microcomputer lockup cabinets which effectively prevent all physical access.

Data leaving the organization, purloined or borrowed, constitute a major security problem. Simply locking desk drawers is sufficient to protect most floppy disks. Critical floppies should be placed in the office safe. Data stored on a hard disk are more difficult to protect. Anyone sitting at the microcomputer can browse through files, files which often contain a

manager's entire software library as well as most of the information he or she works with daily. One security method is to put a physical lock on a hard disk which will eliminate password needs for single-user systems. IBM's PC AT features a three-position, key-activated switch. One position locks out the keyboard and locks down the central processing unit (CPU) cabinet to prevent unauthorized tampering. Other security measures are discussed in Chapter 7.

RELATIONSHIP OF MANAGEMENT GUIDELINES FOR IC PROFESSIONALS TO END USERS

For effective micro computing in the typical organization, corporate management must look at both sides of the micro computer coin, i.e., the IC professionals and end users, and, in turn, determine a corporate strategy for merging the interests of these two together. Essentially, this can be accomplished by following the management guidelines presented above and those that follow in the next chapter. The fact that the guidelines in this chapter are related one by one to those in the next chapter shows the linkage of integrating interests. From this perspective, a relationship between management guidelines for IC professionals and end users has been established.

CHAPTER SUMMARY

Early in the chapter, the need of management guidelines for IC professionals was set forth to meet end-user needs better. Before exploring these guidelines, emphasis was placed on the establishment of an information center steering committee and the duties of an information center manager. The eight management guidelines related to IC professionals, which should be a part of their daily duties, were examined. These ranged from a proactive approach to establishing control over microcomputer users. Lack of implementation of these guidelines will not only cause friction between IC professionals and end users in terms of computer conflict, but will also result in "the right hand not knowing what the left hand is doing." Additionally, lack of implementation means that the organization is not benefiting fully from the computer revolution, but their competition might be.

NOTE

1. Theresa M. Engstrom, "The Micro Marshall Hits Town," *Datamation* (April 1, 1984): 82.

SELECTED REFERENCES

- Batt, R., "Micros Seen Creating Chaos in Large DP Shops," *Computerworld*, September 19, 1983
- Beeler, J., "Micro Manager Group Proposed on West Coast," *Computerworld*, July 25, 1983
- Campbell, B. W., "The Planning Side of Success with Micros," *Data Communications*, October 1984
- Casto, R., "The Operating Plan, Part Two," *Information Center*, December 1986
- , "Planning Proponents, and Client Support," *Information Center*, December 1985
- Dodge, M., "The Working IC Professional," *Information Center*, July 1987
- Ferris, D., "DP Must Support Company's Micros," *Software News*, August 1983
- Forman, F. L., and G. A. Curtis, "How to Maintain Quality As the Center Assumes New Roles," *Computerworld*, August 11, 1986
- Freedman, D. H., "Helping Keep the User Happy," *Infosystems*, December 1983
- Gilliam, L., "Ten Tips for the Frustrated MIS Manager," *Computerworld*, August 29, 1983
- Gray, C., "The Standard System: Simple Yet Complete," *Software News*, April 1984
- Horwitt, E., "Making Connections," *Business Computer Systems*, February 1984
- Johnston, R. E., "Your Corporate Responsibility," *Infosystems*, October 1984
- Karten, N., "How to Deal with Difficult Users," *Information Center*, May 1987
- , "The Linkers and Linkees," *Information Center*, December 1985
- , "A Matter of Perception," *Information Center*, January 1985
- Keen, P. G. W., and L. A. Woodman, "What to Do with All Those Micros," *Harvard Business Review*, September-October 1984
- Kimmerly, W. C., "Leadership Is Crucial," *Datamation*, November 15, 1984
- Krasnoff, B., "Micro Managers Form Their Own Support Groups," *PC Week*, May 26, 1987
- Lyon, M., "The Computer As Compulsion," *Information Center*, May 1986
- McKibbin, W. L., "IBM and the PC Maintenance Puzzle," *Infosystems*, May 1984
- , "A Solution to PC Management," *Infosystems*, February 1984
- Miller, F. W., "Develop a Partnership with Your Users," *Infosystems*, December 1983
- , "PC Compatibility," *Infosystems*, October 1984
- Peterson, P., "Branch Office Microcomputing," *Datamation*, November 15, 1984
- Press, L. I., "Point of Purchase," *Business Computer Systems*, March 1984
- Rifkin, G., and J. Cogen, "Coping with the Micro Invasion," *Computerworld, Office Automation*, June 13, 1984
- Shoor, R., "Micro Managers: New Skills & Problems," *Infosystems*, January 1986
- Stone, J., "Are DP Managers Fighting Micro Acceptance?," *Computerworld*, April 23, 1984
- , "User Training by DPers Strengthens Needed Ties," *Computerworld*, April 30, 1984
- Tharrington, J. M., "Introducing Microcomputers Successfully," *Infosystems*, March 1984
- Thiel, C. T., "An MIS Productivity Tool," *Infosystems*, September 1984
- Vogt, E. E., "Managing the PC Revolution," *Datamation*, November 15, 1984
- Withington, F. G., "Managing Your IS Pros," *Datamation*, October 15, 1987

10

MANAGEMENT GUIDELINES FOR END USERS

ISSUES RAISED AND EXPLORED

- To examine the need of management guidelines for assisting end users.
- To discuss the establishment of obtainable computing goals that are related to the organization's critical success factors.
- To discuss approaches to resolving or, at least, reducing computer conflict in a typical organization.
- To set forth appropriate guidelines that are linked to end users.
- To explore the relationship of management guidelines for end users to IC professionals.

OUTLINE

Introduction to Management Guidelines for End Users

Need of Management Guidelines for End Users

Establishment of Obtainable Computing Goals for End Users

Relating Computing Goals to Critical Success Factors

Resolution of Conflict between IC Professionals and End Users

Approaches to Resolving or, at Least, Reducing Computer Conflict

Selection of the Best Approach to Resolve or, at Least, Reduce Computer Conflict

Eight Management Guidelines Related to End Users

Establishment of Ownership in the Information Centers

Provision of Input on Acquiring Computer Hardware and Software

Active Participation in the Development of Computer Applications

Being Receptive to IC Professionals Acting As Change Agents

Active Participation in End-User Training

Two-Way Communication on Current Computing Problems

Active Participation in End-User Group Meetings

Being an Integral Part of the Computing Control Process

Relationship of Management Guidelines for End Users to IC Professionals

Chapter Summary

Notes

Selected References

INTRODUCTION TO MANAGEMENT GUIDELINES FOR END USERS

The main purpose of Chapter 9 was to develop and apply management guidelines for IC professionals that are useful in assisting end users. These management guidelines stressed a proactive approach to the microcomputer explosion in the workplace. As one IC manager states: "We in the information centers have to learn how to market the benefits of micro computing before end users start asking us for systems that they need." This proactive approach gives the information centers a chance to bring in standardized systems that will be easily integrated into the corporate environment. It solves the problem of supporting multiple brands. Such an approach is opposed to one in which IC professionals view microcomputers as one might an unwelcome house guest, fearing that microcomputers threaten organization-wide computing efforts with loss of control, loss of security, and corruption of data integrity. It is from the first perspective that management guidelines for end users are developed in this chapter.

NEED OF MANAGEMENT GUIDELINES FOR END USERS

To assist corporate management in improving the strained relationship between IC professionals and end users, the management guidelines in this chapter are complementary to those set forth in Chapter 9. Not only are these guidelines helpful to corporate management in reducing computer conflict, they also represent an integration of IC professionals' and end users' interests, which can result in a fruitful, productive partnership between the two groups. Also, these guidelines provide corporate management with an important means to plan and control end-user computing activities throughout an organization via its information centers.

Underlying current research on information centers is the lack of effective management of end-user computing. Basically, the approach used by IC management has focused on assisting end users with their computing problems and applications as the need is perceived by end users. This backward-looking approach must be replaced by a forward-looking approach, a proactive one, in which the end users' needs of today and tomorrow are anticipated in advance. Due to the importance of the proactive approach, the management guidelines presented in this chapter consider this important item for improving management of end-user computing. In addition, the use of critical success factors will be discussed in the next section as a way of improving the planning process in such a way that end-user applications are directed to those areas that have a high payoff for the organization.

In research conducted on the real benefits that end users can derive from information centers, it was found that, according to 72 percent of the respondents, higher productivity was the best benefit.¹ Improved use of information resources, higher computer literacy, appreciation of computer systems, and higher data processing productivity are also cited by respondents. Based upon this research, if a proactive approach was used along with identifying critical success factors and using them as a basis for planning/controlling systems, the preceding benefits would have undoubtedly been realized to a greater degree. Hopefully, the application of the management guidelines presented in this chapter and the previous one will lead to higher percentages in the future.

ESTABLISHMENT OF OBTAINABLE COMPUTING GOALS FOR END USERS

A logical starting point for initiating management guidelines for end users is to begin with their relationship to the establishment of end-user computing goals. Inasmuch as the most significant payoff is that end users become more knowledgeable about computerized systems, there is a need to specify goals to which end users can aspire. Among these goals are achieving high levels of operational independence and the concomitant rewards of reduced frustration. These goals take the form of more autonomy over computerized operations as opposed to the past where the MIS department had the last word on almost everything. As a result of these end-user goals, enlightened IC professionals learn that it is in their best interests to support the acquisition of microcomputers and, thereby, to relieve the burden of ongoing support.

Other desired microcomputer goals of end users center on achieving their own specific goals more easily through some type of MBO program. In this manner, not only are their own personal goals achieved, but also those of the organizational units to which they belong. In addition, desired computing goals assist the end users in achieving goals by functional areas. Overriding all of these microcomputer goals is increased productivity

whether it be in a manufacturing or a service-oriented environment. The capability to increase sales and/or reduce costs with new information is a most desirable end-user computing goal.

Relating Computing Goals to Critical Success Factors

As a way of defining computing goals for end users that tie back to corporate goals, it is necessary to utilize critical success factors (CSFs) analysis. Such an approach enables end users to think about the information they need to fulfill their most important tasks. Basically, CSFs comprise a set of tasks that must be achieved to meet corporate goals. Citing the U.S. automobile industry as an example, improved quality, sound pricing strategy, and cost control are the critical success factors behind the goal of survival in the face of increasing foreign competition. CSFs arise from the particular industry in which a company exists and from a company's competitive position and strategy within that industry. Also, CSFs can be affected by temporal factors such as a threatened strike or increasing government regulation.

Once critical success factors have been defined, end users must determine the methods to measure progress toward their achievement. This analysis is a bridge from the corporate goals to a more specific view of what the CSFs are. Once the information has been determined so that these critical success factors can be measured, the information system needs for end users are spelled out. CSF analysis is useful in a number of different ways. It can be used to develop specific reports and databases for use by end users, i.e., an individual manager or a clerical worker. The analysis can be used to define information center planning priorities, pointing out where time and money should be spent in developing end-user software tools. Finally, CSF analysis can be used for management resource allocation to indicate where efforts must be focused to achieve the defined corporate goals.

Overall, critical success factors analysis is an important means for end users to understand those functions that are critical to the organization's success. These CSFs are then translated into the need for developing micro managerial and operational reports that can be used to plan and control these critical areas. In turn, these reports are related to microcomputer goals, in particular, to increasing productivity of end users.

RESOLUTION OF CONFLICT BETWEEN IC PROFESSIONALS AND END USERS

As stressed throughout this book, the current invasion of microcomputers has provided end users with long-sought independence from the MIS department. Furthermore, this attitude is by no means restricted to end users. IC managers and their staffs also feel much the same way. Why

should IC professionals worry about the detailed development and control of applications programming if end users are content with their new-found microcomputer self-reliance?

These attitudes illustrate a trend that needs to be confronted before it is allowed to evolve into a more serious problem for the coming transition to fully integrated microcomputing. The net result is a win-lose philosophy, that is, organization end users win, but the IC professionals lose since the expertise of the information center's staff is being used to a limited degree. This approach to microcomputing should not be perpetuated. End users, IC professionals, and corporate management must address the long-range issues of this transition and plan accordingly; otherwise, computer conflict will escalate to an unbearable level.

In order to resolve or, at least, reduce the conflict to a tolerable level, any recommendation must recognize that end users and IC professionals need each other, even though their value systems are often different. Conflicting values can be found in many areas, such as the efficiency of getting the job done versus security over microcomputers and autonomy over work versus control over microcomputers. In view of these realities, corporate managers must be prepared not only to confront conflict when it arises, but also, even more importantly, to reduce or resolve it as much as possible. Although approaches for resolving or minimizing conflict vary depending on the situation, their underlying philosophy is a win-win approach.

Approaches to Resolving or, at Least, Reducing Computer Conflict

Several generalized approaches to resolving or, at least, reducing conflict of any type have been identified by several management researchers:

1. *Forcing* by having one party impose its set of values on the other
2. *Withdrawing* and retreating from the conflict
3. *Compromising* or bargaining to search for intermediate positions
4. *Smoothing* or playing down the differences and emphasizing the values held in common
5. *Confronting* the conflict with an open exchange of information and working through the differences so that both sides can win.

The last approach is behaviorally oriented, since it is a win-win philosophy instead of the traditional win-lose philosophy. For the confronting approach to be really effective, it should operate in an open atmosphere in which there is mutual trust and acceptance of the fact that conflict is inevitable and that mistakes can be made on both sides. The admission of guilt by one of the parties should not be construed as a sign of weakness, but rather as an acknowledgement that one is rarely completely right or completely wrong.

Selection of the Best Approach to Resolve or, at Least, Reduce Computer Conflict

In a study of seventy-four managers in an engineering department of a large corporation, opinions concerning the efficacy of these five methods of dealing with conflict were obtained. Correlations were computed between these methods and their effectiveness to resolve conflict. The results are as follows: (1) forcing, -0.26 ; (2) withdrawing, -0.19 ; (3) compromising, -0.08 ; (4) smoothing, $+0.20$; and (5) confronting, $+0.26$.² As the data show, the confronting approach resulted in the highest positive correlation, followed by the smoothing approach. In a second study of fifty-three managers from various organizations, managers were asked to write descriptions of both effective and ineffective resolutions they had experienced. Again using the five approaches described above, the study showed that 58.5 percent of the effective resolutions used the confronting approach and that 24.5 percent used the forcing approach. None of the ineffective resolutions used confronting, but 79.2 percent of them used forcing. The other three methods appeared to be used an insignificant portion of the time, except for withdrawal which was employed in 9.4 percent of the ineffective resolutions. Both studies indicate that the confronting, win-win approach will usually effect better resolutions than the other four methods. Based upon these research data, corporate managers would be well advised to use this approach as an underlying philosophy when interacting with end users and IC professionals. Similarly, IC professionals should do likewise when interfacing with end users.

EIGHT MANAGEMENT GUIDELINES RELATED TO END USERS

Appropriate management guidelines for end users are developed in the next sections of the chapter. These guidelines are developed from the win-win philosophy described above. As such, they are designed to facilitate the complementary guidelines set forth in Chapter 9 for IC professionals. The focus of the guidelines for end users is to make organization-wide microcomputing efforts more effective in terms of day-by-day operations. From this viewpoint, the eight management guidelines are as follows:

1. Establishment of ownership in the information centers
2. Provision of input on acquiring computer hardware and software
3. Active participation in the development of computer applications
4. Being receptive to IC professionals acting as change agents
5. Active participation in end-user training
6. Two-way communication on current computing problems
7. Active participation in end-user group meetings
8. Being an integral part of the computing control process.

Establishment of Ownership in the Information Centers

As stressed in an early part of this book, the expanding applications backlogs of MIS departments was the motivating force behind the introduction of the information center concept. Also, it was pointed out that the implementation of microcomputers has whetted end users' appetites for computing power. However, the proliferation of microcomputers throughout the end-user community may not reduce the applications backlog as MIS departments had hoped. Instead, this proliferation may destroy the old computer phobia as millions of new end users will devise new applications. Thus, the number of applications to solve specific corporate problems will grow dramatically rather than decrease.

Focus of Information Centers is Directed toward End Users. In view of these facts and those specified in Chapter 9 for micro support and micro maintenance, effective information centers must be directed toward end users with full support. Full end-user support means that information centers assist users to satisfy their information needs by providing as many computing alternatives as possible, including developing user systems whenever deemed feasible. The information centers help end users select the appropriate solution to their specific problems and provide them with the appropriate education and training. As a result, end users are able to choose any viable computing alternative as long as the user department managers are willing to pay for it and overall corporate interests have been protected.

Within this framework, end users have established an ownership in the information centers. This integration of interests between IC professionals and end users not only has very positive implications on a short-term basis, but also builds long-term implications for effective departmental computing decisions. The successful bridging of a relationship between the IC professionals and the end users, then, must be based upon a win-win philosophy. If end users feel that their problems are being solved in a manner desirable to them, they will regard the IC professionals in a positive way, thereby establishing an ownership in the center. Similarly, the reverse is true. Also, the integration of interests will facilitate the matching of user requests for information with appropriate computing alternatives, user training, user computing, equipment acquisition, and so on.

Provision of Input on Acquiring Computer Hardware and Software

Although input from end users on acquiring computers, in particular micro hardware and software, is helpful to IC professionals, it is not without its problems. For one, end users often spend most of their time thinking about the microcomputers, their features (i.e., the bells and whistles), and their capabilities and less time about the problems they want the micro to solve. For another view, end users tend to be impulse

buyers. The buyers may sit through long dissertations on the micro hardware and software, but, in the final analysis, they buy on the "sports car" aspect. In addition, end users typically do not think to ask about service and support. Many times, it turns out that service and support are far and away the most important criteria in a purchase. Finally, end users do not know whether the microcomputer can run this software or that software or whether it has this feature or that feature. Because these essential considerations are ignored by end users, microcomputer hardware and software, along with their resulting systems, ultimately are going to fail. Appropriate end-user guidelines for acquiring hardware and software are presented below within a limited framework; the orientation is a positive one.

Hardware Considerations. Available input from end users on the acquisition of microcomputers should focus initially on the application(s) to be implemented. Too often in the past, the accent from the end-user viewpoint has been on the microcomputer(s) to be acquired. As a result of reversing the proper approach to micro acquisition, the wrong type of hardware was acquired. This was not only the fault of the end users, who were swayed by salespersons, but also the result of inadequate knowledge about micros. In other words, it turned out to be "the blind leading the blind." By starting with the application(s) first and working with IC professionals, end users can now take an intelligent approach for implementing their application(s) with the proper micro hardware. The only exception to this approach is where the end user is on an equal basis with the IC professionals in terms of his or her knowledge about micro technology.

If corporate management has difficulty in using the above guideline, another approach, which has proven successful in many organizations, allows end users to acquire hardware at a 25 percent to 33-1/3 percent discount for recommended machines. This simplistic acquisition policy allows the organization to standardize microcomputers in a straightforward, easy manner. In effect, end users are encouraged to buy micros that are compatible with the organization's mainframes and other micros so that they can be linked together when necessary—now or in the future.

Software Considerations. The same approach of end users providing intelligent facts about their hardware needs to IC professionals should be applied to software. The acquired software should be capable of more than fulfilling the desires of end users for a specific application area. It should be integrated. This term implies that all of the functional modules are integrated within the program, and the related transactions performed within each of them automatically interact, interface, or interconnect with one another. In essence, an entry made in one module will thus flow through to update or post associated entries in all of the other modules.

With a truly integrated accounting program, for example, a user should only enter or key the data once. Currently, for PC-based accounting, the degree of integration provided varies from program to program. A typical

software package that integrates a few commonly used applications is Lotus 1-2-3. Such a package satisfies users' needs for spreadsheet calculation, database management, and business graphics, along with some other desired features.

Another important consideration for acquiring software from the end-user's viewpoint is the software environment that integrates separate application programs, allows them to appear simultaneously on sections—"windows"—of the CRT screen, and often incorporates easily used features, such as pointing devices to control the CRT display. Although easily used systems that allow separate application software to work together are just becoming mainstream products, many of their features appeared some time ago. The Star from the Xerox Corporation and the Lisa from Apple Computer, Inc., each breaks its screen into windows and lets a user move data between them. Each also includes a pointing device (Xerox dubbed it a "mouse" because of its size and tail-like connecting cord) which moves the cursor around the screen.

Active Participation in the Development of Computer Applications

As a starting point in developing computer applications and establishing priorities for end-user applications, end users typically move through three different stages, which are discussed below.

Stages in Becoming Active Microcomputer Users. Micro end users go through three stages before they become active microcomputer users. In the first stage, end users experience *wonderment*; that is, many new users suffer mental agonies as they begin to approach the subject of microcomputers. The vast majority simply wonder how micro automation will improve their lot on the job and, given the opportunity to become end users, whether they will do well and perform well on the job. The psychological situation is not too much different from that which results from other major changes in one's career, such as obtaining one's first job or becoming a manager.

Because users are psychologically vulnerable during this period, they are unduly influenced by what they experience. Machine breakdowns, boring instruction, abstruse systems documentation, and irrelevant applications tend to lessen their confidence in their abilities to cope and their interest in moving ahead. It is most important that new users work with user-friendly instruction on microcomputer hardware and software.

At stage two, users experience *enlightenment*. As any trainer in an information center has found out, it can be a rewarding experience when users succeed at the simplest information processing chores, like printing out their first word-processing documents or observing the results on the monitor from their database queries. Expressions like "This is fantastic!" and "I can't believe it!" permeate the classroom. These successes give a terrific boost to the users, increasing their beliefs in themselves and their

expectations of meeting the training challenge. For this and other reasons, the early phases of user training, both in the classroom and on the job, should emphasize personal achievement, not notions of fancy advanced technology. In literacy training, the impact on the user of presentations of advanced technology, such as movies of control systems, is negligible compared with the victory of a first-time paragraph move during a hands-on word processing exercise. For this purpose, the microcomputer is ideal because it provides a total systems environment under the complete control of the user.

Achievement is the third and final stage. The conversion process is complete when end users see output that directly relates to their jobs via the microcomputer's printer. They are exhilarated, if not made heady, by the obvious productivity gains inherent in well-designed systems, and many have positive prospects for the future. Continuing achievements lead to a growing systems maturity and independence. It should be noted that, for some users, this results in misplaced beliefs that they can do completely without the information centers. For this reason, at some point during this stage, IC professionals should step in with a program, a seminar, a briefing, or some other program, to bring end users into the arena of production systems, sobering them up with notions that they never considered before and steering the user maturation process toward more realistic goals.

Active Involvement in Developing Computing Applications. Going beyond the third stage, achievement, the end users generally get involved in developing computing applications for their work tasks. This means getting involved in utilizing third- and fourth-generation programming languages. Only when the realities of learning computer programming and operating system fundamentals are discovered, do the end users begin to search for a package that someone else has written. The emphasis shifts from "I am unique and need to develop my own applications" to "I am really no different from any other company, so I can use someone else's package." Based upon this line of reasoning, end users are turning to packaged applications for the reasons given in Figure 10-1.

The alternative approach to packaged software is custom development for microcomputer users. Custom development is feasible only if there is no readily available prepackaged application that meets most of the desires of the company or if, with modifications, it requires more time and money than custom programming. The decision of whether to buy a packaged application or to develop it in-house is the same for a microcomputer application or for a mainframe installation; only the cost is different.

Need for a Balanced Perspective in Microcomputer Applications. Although active involvement of end users is extremely desirable, there is a word of caution for corporate management. There are extremes to be avoided by end users, that is, overutilization of microcomputers when it comes to in-house custom development. Like workaholics, "computaholics," electronic junkies, use the machine to avoid something

Figure 10-1
Reasons for End Users Turning to Packaged Applications

- End users do not have the ability or the time to create good, well-documented, or well-controlled applications.
- End users are more interested in developing special-purpose application packages that meet specific requirements.
- End users believe that it will take too long and cost too much money to have the MIS department develop the applications.
- End users feel that they can choose the best of two worlds—utilize the microcomputer for smaller applications and take advantage of the software power of packages that can upload and download models to the computer mainframe.

else—life itself, perhaps, or work that is hard or unpleasant. The main symptom they display is compulsive use of the computer. For some, there is something addictive in the power of the hardware or software; for others, the allure is the information the computer makes available. There is little difference between them except that the “information freak” tends to be more normal than the “computer nerd.” In extreme cases, computaholics resemble the Bowery bums whose lives are controlled by a different habit. Some may even look as if they have slept in their clothes. Days spent at the terminal is their kind of bender. Suffering from the same lack of self-esteem that plagues other addictive types, computaholics can have difficulty dealing with other organization personnel.

For example, one brokerage firm president found out about “terminal fever” the hard way. Alarmed that the number of reports published by his research department was steadily dwindling, the president visited the department and found many security analysts totally engrossed with their new micros. Concerned that micros were supposed to bring productivity gains, not losses, the president called in a computer consultant to work up a blueprint for managing micros. In turn, the consultant taught the analysts how to use their machines most efficiently.

Being Receptive to IC Professionals Acting As Change Agents

The main theme of the counterpart of the management guideline in the prior chapter centered on IC professionals acting as consultants to microcomputer users. In defining their role in the acquisition of microcomputers, IC professionals should perform as more than consultants but as less than dictators. The organization needs one area to be responsible for the effective use of the corporate dollar. If the organization wants to share information and to interconnect systems, that narrows the number of acceptable computers. No personnel are better suited to writing guidelines and overseeing the procedures than the IC professionals acting as consultants.

Using the basic premise of what IC consultants should and should not be doing, the management guideline here is that end users should be receptive to IC consultants. Going beyond their traditional role, IC consultants can assume the role of change agents by planning and gaining acceptance for changes in the ways in which computers are used. However, there is a word of caution. A certain amount of change can cause a certain level of anxiety on the part of end users. In fact, too much change can cause people to become negative toward the changes.

Best Approach to Assist End Users. Because the IC consultant acting as a change agent brings a certain amount of change to the way in which end users perform their jobs, the question can be asked: "How should a change agent act when he or she wants to change end users in the organization to improve their jobs and their resulting productivity on the job?" By being sensitive to the organizational environment, the change agent will have a better idea of the extent and force of change that will be acceptable and which will accomplish end-user computing goals. Additionally, there are a number of change-agent roles from which to select: persuader, catalyst, confronter, and imposer (see Chapter 4). The attendant circumstances will dictate which role is the best one.

Active Participation in End-User Training

Before end users can participate actively in end-user training, IC management must integrate training into the MIS strategic plan which builds one step at a time, i.e., a building-block approach. The major building blocks in microcomputer training are a basic understanding of the technology and how to operate the system, the application of that technology, and the realization of the potential of integration and networking. The training, through this building-block approach, must start at the top of the organization—assist corporate managers to understand the concepts of microcomputers and work down through the different levels of the organization, training each level in the skills required to use the micros fully.

Different Levels of End Users Require Different Types of Training. End users who come in for microcomputer training will range from the individual who has never seen a micro all the way up to professionals who are almost programmers because they know either BASIC or the C-language. These users are not only manipulating data, they are fully involved in the code and are capable of patching programs.

To identify end users on the basis of their experience with microcomputers, it is helpful for IC professionals to know whether they have a home computer. Many such users know how to put in a disk, and they know the importance of the operating system; they come into the training sessions with a few months of experience. On the other hand, others who have

home computers still may not know how to use them. Although many of the commonly used application packages come with the training software provided by the vendor, the training software often is useless. It does not give enough information on how to use the applications packages, so the end users seek more training.

Two-Way Communication on Current Computing Problems

As discussed in the prior guideline, information centers are an important means to disseminate information about microcomputers. This training and subsequent communication with the information centers can result in a one-way communication between IC professionals and end users. This is generally not the best approach; it is better to establish a two-way communication so that there is an open exchange that focuses on solving current computer problems for end users. This approach ensures that end users will receive as well as give back information concerning their day-to-day micro problems. The key here for end users is to listen and, in turn, to communicate, thereby providing feedback to the IC professionals.

To illustrate the importance of two-way communication, consider the micro software problems of novices as well as those of the many experienced end users. Although the IC professionals are technically the best qualified to select software, there are other considerations—such as features and ease of use—that affect the users and therefore deserve their evaluation. While this process may seem tedious or circuitous to IC professionals, it is an important way to relieve the anxiety and frustration of end users by making them a part of the micro process. The net result is that it will cut back on the amount of hardware and software purchased that are not compatible with end-user needs.

Two-way communication can be taken a step further by providing end users with a format to talk among themselves with the IC manager acting as counsel or group leader. Newsletters, hot lines, and end-user groups (as discussed in the next guideline) all work toward this end. The bottom line is that users who are often confused and find it difficult to explain their problems can get them answered to their satisfaction.

Active Participation in End-User Group Meetings

Across the country currently, numerous groups of corporate microcomputer users are gathering at night in conference rooms, college classrooms, and other semipublic places to hear about the latest software packages, to share advice, and, in general, to communicate about their lot in life. As the head of one IBM-compatible user group said: "Most managers say, 'Okay, I bought it for you, now what are you doing with it?'" As indicated in Chapter 9, computer user groups are more than just middle-aged versions of video arcade gatherings. User groups typically are machine specific;

afficionados of IBM, Apple, or Atari then split into special-interest groups (SIGs). A typical IBM PC user group is made up of SIGs for investing, spreadsheets, word processing, and a dozen other subcategories. One SIG on investing, for example, is so sophisticated that a software consulting firm offers free office space for the meetings.

Activities of End-User Group Meetings. The activities of end-user group meetings vary from organization to organization. In general, they give IC professionals and end users a chance to interact on a wide range of activities. For example, members of one corporation's information centers have a chance to respond to user complaints and to give users a glimpse of anticipated new products and services.

For typical end-user group meetings, most of the discussions appear to be a positive step toward improved relations between end users and IC professionals. At the same time, however, they have tended to point up some serious pitfalls in the ability of end users to solicit information from their information centers. In particular, it seems the one question that ought to be asked is: "Why is this shoe on that foot?" In other words, how is it that IC professionals and not the end users are taking this initiative in the first place? As one IC professional pointed out at a recent meeting: "Shouldn't it be the users themselves who organize the meetings, arrange the agenda, solicit the speakers, and so forth?" Yes, the active cooperation and efforts of the users are completely necessary for this sort of interchange to take place, but is not the main purpose of such a dialogue to allow IC professionals to respond to user concerns? And who can better determine and give voice to those concerns than the users themselves?

As a way of getting involved in microcomputers beyond those used on the job, end users can sort through the myriad of new product announcements. Since few companies can afford the full-time staff required to review the hundreds of spreadsheet, word processing, and database packages appearing on the market each year, the end-user groups are an ideal place for "kicking the tires" electronically. Vendors show their wares in a more sophisticated type of Tupperware party.

Even in the situations in which corporate microcomputer support is available, end-user groups are critical. For example, one end user had trouble printing a spreadsheet from his IBM PC/XT. A telephone call to the corporation's PC user hot line resulted in useless advice to make sure that the printer was plugged in. The solution eventually came from another member of the local end-user group, namely, that he had exceeded the maximum number of columns. When one is a member of an end-user group, what might be a major question to one might be minor to someone else in the group. Users can learn a lot from word of mouth.

End-user groups can be looked upon as a more efficient and accessible means of gleaning information than either more structured training or software manuals. The bulk of material presented in a formal class can be intimidating; manuals can be virtually incomprehensible to the novice.

Group affiliations can be particularly valuable early on, when "getting past the scared stage" is the major hurdle. For workers drafted into the microcomputer revolution—those, for instance, who feel pressure to perform efficiently with their microcomputers at work—end-user groups are often more than a convenient alternative; they can be a last resort.

Being an Integral Part of the Computing Control Process

Typically, before the arrival of microcomputing, managers used a control process necessary to get the job done. Now, with the proliferation of micros, many managers first repond to such a situation by searching out ways to exert more control over the work process. The more managers attempted to control the process, the more employees found ways to subvert that control. This response is particularly common when outsmarting the system becomes the new ground on which to develop and test one's mastery. Managers may dismiss these subversive activities as resistance to change, but in many cases this resistance is the only way employees have of responding to the changes they face.

For instance, in almost all accounts of routine work, researchers report that employees are daydreaming and bantering with one another while they accomplish routine noncomputer tasks. Of course, they must pay attention with their eyes, but not so much with their brains. In contrast, end users concentrating on a visual display unit of a micro must pay a very different kind of attention. If end users are to understand and properly respond to information, they must be mentally involved.

From a corporate manager's perspective concerning the micro control process, neither physical activity nor interpersonal behavior appears to be the most appropriate target of managerial control. Instead, patterns of attention, learning, and mental engagement become the keys to effectiveness and high-quality performance. Obviously, there has always been a need to pay attention to work in order to accomplish it properly. But the quality of attention for micro work is essentially different. The message from the foregoing is that corporate managers must make micro end users an integral part of the control process.

Security Aspect of the Micro Control Process. Because microcomputer security is an important part of the micro control process, it receives a good deal of management attention. An effective security policy should be as simple as possible for end users, should not be time consuming, should not require the establishment of a whole new organizational structure, and should be easy to implement. Complex encryption software and elaborate data security procedures can often discourage system use or prompt users to find ways of circumventing the procedures. Although appropriate for certain applications and in particular environments, such security measures are often no more effective in securing data on diskettes than storing and locking the diskettes (and backups) in a restricted area. Because

appropriate security measures were discussed in Chapter 9, reference can be made to that section of the chapter. Overall, security measures should center on ease of use rather than on constraining the end users.

Insurance Considerations. Related to the foregoing activities of the micro control process is the threat of damage to the corporation's assets. With the increasing dependence on microcomputers, corporate managers recognize the need to extend insurance policies to cover them specifically. The micros' smaller size and their dispersion around an organization make them particularly vulnerable to misuse or theft.

What can an organization expect to pay for microcomputer insurance? According to Safeware, The Insurance Agency Inc. (Columbus, Ohio), which provides microcomputer insurance, microcomputer insurance follows the expansion of the micro market. Safeware offers a computer owner's policy which covers \$8,000 worth of equipment—hardware, purchased software, and documentation, and media (diskettes, cassettes, and tape used for backup)—with an annual premium of \$75 with a \$50 deductible; \$11,000 worth of coverage costs \$90 a year with a \$75 deductible. The company also offers a key computer policy for larger installations which insures \$11,000 worth of equipment and gives \$15,000 more coverage (\$5,000 each) for losses due to computer fraud, loss of software—including coverage for replacing customer-developed software—and extra operational expenses incurred, such as re-entering data or renting computers. It should be noted that this does not cover profit losses. The yearly premium on this is \$139, with a \$200 deductible. Safeware also tailors policies for larger microcomputer installations. For companies with, say, 2,000 microcomputers, it looks into such factors as the location of the micros, electrical supply, safety precautions, construction of the building, and other risk factors. In addition, the company insures both lessors and lessees, as well as the owners of computer equipment.

RELATIONSHIP OF MANAGEMENT GUIDELINES FOR END USERS TO IC PROFESSIONALS

In the preceding sections of the chapter, management guidelines were discussed at some length. An integral part of the guidelines is an attempt by corporate management to resolve or, at least, reduce the computer conflict caused by a difference in goals between IC professionals and end users. Basically, it arises from end users' concern with improving productivity versus IC professionals' concern with technical issues. Typically, IC professionals focus on the user's perceived solution to an information processing problem; however, they should be focusing on the situations that create the problem. In effect, the micro issue typifies the communication breakdowns between IC professionals and end users.

As indicated previously in the text, the *real* issues to be addressed regarding microcomputers are quantifying end users' expectations and

information processing requirements. The focus should be on what the end user is trying to accomplish versus how the user is trying to accomplish it. By focusing the end user in a goal-directed manner toward establishing the what, IC professionals can move into a supportive service-oriented role. The result of this redirection is the establishment of a cooperative effort, i.e., a partnership, that allows both IC professionals and end users to focus on concise, positive problem resolution. An empathetic relationship evolves with appreciation of each other's concerns which results in non-threatening solutions that can be supported by corporate management. In summary, there is a need for a new direction that centers on end-user management guidelines oriented toward solving the problems per se versus fitting technical solutions to problems.

CHAPTER SUMMARY

The end-user management guidelines presented in this chapter and the IC professional management guidelines presented in Chapter 9 relate to the fact that corporate management must cope with important issues when integrating microcomputers into their organizations. Among these are not only controlling the micro technology and tying it successfully to the MIS department and information centers, but also improving decision making, raising productivity, cutting information costs, and boosting work efficiency. The proper application of these management guidelines should assist corporate management in improving the effectiveness of the total organization. As demonstrated in the chapter, end-user management guidelines which complement those presented in Chapter 9 ranged from the establishment of ownership in the information centers to end-user involvement in the micro control process. They represent areas that are critical to corporate management in resolving or, at least, reducing computer conflict to a tolerable level. Essentially, these end-user management guidelines are based upon a proactive approach rather than a reactive one.

NOTES

1. "Chargeback Claims Info-Center Role," *Computer Decisions* (May 1984): 16.
2. Ronald J. Burke, "Methods of Resolving Superior-Subordinate Conflict: The Constructive Use of Subordinate Differences and Disagreements," *Organizational Behavior and Human Performance* (July 1970): 400-403.

SELECTED REFERENCES

- Barnes, R., "Abundant Applications Beguile New Users," *Computerworld*, April 30, 1984
- Beeler, J., "Micro and the End Users," *Computerworld*, December 26, 1983, and January 2, 1984

- Brancheau, J. C., D. R. Vogel, and J. C. Wetherbe, "An Investigation of the Information Center from the User's Perspective," *Data Base*, Fall 1985
- Briggs, G., "Middle Managers Warned: Master New Techniques," *Management Information Systems Week*, August 8, 1984
- Brown, G. D., "The Hot Medium," *Information Center*, August 1985
- Dooley, B., "At the Bank of Boston, Doing It Right Means a Personal Computer Center," *Micro Manager*, June 1984
- _____, "Getting Information Where It's Needed—Fast," *Micro Manager*, August 1984
- Dorfmann, J., "Making the Most of User Groups," *Infosystems*, March 1985
- Drake, S., "The Uses of User Groups," *Data Training*, August 1987
- Freedman, D. H., "Dodging a Compatibility Crisis," *Infosystems*, June 1984
- Friedman, S., "DP Insurance, Customized Policies for Micro Protection," *Micro Manager*, July 1984
- Glazer, S., "Windows Battle Shapes Up," *Mini-Micro Systems*, March 1984
- Guimaraes, T., "The Evolution of the Information Center," *Datamation*, July 15, 1984
- Hall-Sheebey, J., "Building up User Courage," *Information Center*, December 1986
- _____, "The Rise and Fall of Corporate User Group," *Information Center*, June 1986
- Harrar, G., "Information Centers, The Users' Report," *Computerworld*, December 26, 1983, and January 2, 1984
- Hartigan, P., "From Technical to Practical: User Groups Are Growing Up," *PC Week*, May 26, 1987
- Inmon, W. H., "When Users Pay Their Way," *Information Center*, December 1985
- Ives, B., M. Olson, and J. J. Baroudi, "The Measurement of User Information Satisfaction," *Communications of the ACM*, October 1983
- Karten, N., "A Matter of Perception," *Information Center*, January 1985
- _____, "Users, DPers: They're More Similar Than You Think," *Computerworld*, April 30, 1984
- LaMotta, T., and J. Bernknopf, "Explorations in End-User Computing," *Information Center*, April 1986
- McClain, G. R., "How to Talk to Your Techie," *Information Center*, February 1987
- McCusker, T., "Spreadsheets Not Just for Micros Anymore," *Software News*, May 1984
- Millar, V. E., "Decision-Oriented Information," *Datamation*, January 1984
- Miller, F. W., "Bridging the Gap between Users and DP Staffs," *Infosystems*, June 1984
- _____, "The Great Payback," *Infosystems*, July 1983
- Murphy, J. A., "Reflecting on Software Integration," *Software News*, April 1984
- Myers, E., "United We Stand," *Datamation*, April 1, 1984

- _____, "What the User Expects," *Datamation*, April 15, 1984
- Rauch-Hindin, W., "User Interfaces, The Key to Executive Computer Use," *Systems & Software*, April 1984
- Rawlings, N., and J. Rawlings, "The Care and Feeding of Newsletters," *Information Center*, January 1987
- _____, "Finding the Technical Users," *Information Center*, September 1986
- _____, "Promoting User Independence," *Information Center*, November 1986
- Rifkin, G., "The Users Group Explosion: Do They Really Have Influence?," *Computerworld*, February 9, 1987
- Rockart, J. F., and L. S. Flannery, "The Management of End User Computing," *Communications of the ACM*, October 1983
- Roman, D. R., "Users: The New Corporate Heros," *Computer Decisions*, March 15, 1984
- Santarelli, M-B, "In-House User Groups," *Information Center*, May 1986
- Sealund, B., "The End User As Developer," *Data Training*, August 1985
- Siegel, E., "The Selling of Software," *Datamation*, April 15, 1984
- Stone, P. S., "Publisher Uses Micros to Write and Produce Books and Learning Tools," *Micro Manager*, September 1984
- Sutton, R. I., and A. Rafaeli, "Characteristics of Work Stations As Potential Occupational Stressors," *Academy of Management Journal*, June 1987
- Thiel, C. T., "Using Computers to Connect with People," *Infosystems*, April 1984
- Zuboff, S., "New Worlds of Computer-Mediated Work," *Harvard Business Review*, September-October 1982

INDEX

ABC Corporation: background on IC staffing problems, 130-31; computer-based training problems, 156-57; conflict between the end users and the information centers, 49-50; conflict between the MIS department and the information centers, 48-49; control and security over information centers and microcomputers, 181-86; control problems over information centers and microcomputers, 181; corporate management's selling an overall direction in the acquisition of computer hardware and software, 81-82; development of an appropriate control environment, 184-85; development of the IC strategic plan, 53-55; enlarging the system capabilities of end users, 134; establishment of a minimum set of standards, 185-86; evaluation of computer-based training problems, 157-59; evaluation of control problems over information centers and microcomputers, 181-84; evaluation of hardware and software planning problems, 77-80; evaluation of IC organization structure

problems, 106-9; evaluation of IC staffing problems, 131-33; evaluation of planning problems of information centers, 50-52; hardware and software planning problems, 75-77; IC organization problems, 106; IC staffing related to improving behavioral skills, 133-34; IC training development program, 156-60; information center staffing problems, 48; integration of interests of organization units by corporate management, 109; interaction of corporate management with MIS and IC management to develop appropriate plans, 52; master case study of information centers, 16; microcomputer policy as an integral part of the IC strategic plan, 55; organizational changes to meet end-user needs, 109-10; organization of information centers, 103-10; planning an overall strategy for successful operations, 47-48; planning for hardware and software integration, 74-83; planning problems of current information centers, 48-50; profiles of IC professionals and end users, 128-34; purpose and size of each information center, 16-17;

- recommendations to improve control over information centers and microcomputers, 184-86; recommendations to improve hardware and software planning, 80-83; recommendations to improve information center planning, 52-55; recommendations to improve information center staffing, 133-34; recommendations to improve information center training, 159-60; recommendations to improve organization of information centers, 109-10; tying in capital requirement procedures with micro acquisition, 82-83; training in use of corporate culture to integrate interests of IC professionals and end users, 134; training of microcomputer end users, 159-60; utilization of security measures over microcomputers, 185
- Active supporter approach, 176-77
- American Can Company, 8
- Anchor-Pad, 233
- Anderson Soft-Teach, 143
- Apple Computer, Inc., 204, 228, 245
- Apple II, 14, 34-35, 38, 195, 204, 219, 226, 250
- Arthur Young Business Systems, 143
- Atari, 250
- ATI, 143
- Automated office, 152
- Backward-looking approach, 239
- BASIC language, 34-35, 73, 231, 248
- Bechtel Power, 8
- Bell & Howell Service Company, 227
- Bell Laboratories, 34
- Burke, Ronald J., 253
- Burke Marketing Research, 120
- Campbell, Randy, 56
- Catalyst, 94-95
- Cdex, 143
- Certified public accountant firm, 14
- Change agents, 94-96, 121-22, 247-48
- Charge-back system approach, 175-76
- C-language, 248
- COBOL, 73
- Compromising, 241-42
- Compucart, 233
- Computer-based training (CBT): approaches to, 143-44; approaches to delivering CBT training, 144-46; consultant training, 145; continuing support of, 146; evaluation of CBT problems, 157-59; guidelines for selecting CBT training software, 141-43; in-house training, 145; recommendations to improve information center training, 159-60; training problems, 156-57; vendor training, 144-45
- Computer conflict: approach to resolving or, at least, reducing it, 241-42; IC professionals versus end users, 11-14; introduction to, 10-11; large organizations, 13-14; medium organizations, 13; planning an overall strategy, 33-38; problems as perceived by end users, 35-38; problems as perceived by IC professionals, 33-35; real-world examples, 14-16; resolution of conflict, 240-42; selection of best approach to resolve or, at least, reduce it, 242; small organization, 12
- Computer Intelligence, 38
- Confronter, 94-95
- Confronting, 241-42
- Connolly, James, 135
- Consulting, 120
- Consumer Reports, 68
- Control and security over effective information centers: introduction to, 166; linkage of desired IC plans and IC organization with control, 166
- Control Data Corporation, 35, 227
- Copulsky, Jonathan, 220-21
- Corporate asset: information, 4-5; new ways to use it, 5-6
- Corporate culture: defined, 115-16; examination of the impact on MIS activities, 116; use to assist information centers and end users, 116-17
- Corporate policies and procedures: do's and don'ts of, 196-98; establishment of, 194-95; implementation of, 195-96

- CP/M, 34, 100
 Creativity, 193
 Critical Path Analysis, 205
 Critical success factors, 5, 27, 123, 240
 CRM, 144
 Crwth Computer Coursewares, 141
- Data integrity, 168
 Data integrity measures, 170
 Data-MATE, 233
 Data security, 168
 Data security measures, 171-72
 DBMS (DataBase Management System), 39, 66, 206-7
 DDP consultants: duties of, 92-93; to assist end users at remote sites, 92-93
 DEC, 28, 204, 227
 DEC/IBM computing environment, 28
 DEC net, 29
 DEC personal computer, 14
 DEC/VAX, 29
 Defining the computing needs of end users, a starting point, 25-26
 Delta Air Lines, 115
 Deltak, 144
 Development of an effective in-house IC training program: behavioral objectives, 148; continuing development, 150-53; define the appropriate means to deliver the IC training, 148-49; deliver the IC training, 149; delivery schedule, 148; evaluate the IC training, IC trainers, and IC trainees, 149-50; identify specific IC training needs of end users, 146-48; introduction to, 146; manage the IC training program, 150; means of delivery, 148; overview of an effective IC in-house IC training program, 151; screening process for potential IC trainees, 148-49; three-stage IC training development process, 151-53; training materials, 149
 Drexel Burnham Lambert, 7
 DSS change agents: use of systems analysts, 93-95; various roles of, 94-95
 DSS coordinators: assist end users at home office and remote sites, 95-96; role of, 94-95
- Edutronics, 144
 Effective information centers: introduction to, 4
 E. F. Hutton, 7
 End-user group meetings, 231-32, 250-51
 End-user review group, 91
 End users, defining their computing needs: a starting point, 25-26
 Engstrom, Theresa M., 234
 Essex Group, 7-8
 Evaluation and Planning System (EPS), 82
 Expertise of organization personnel: assessing, 117; differing views on IC professionals-corporate managers versus MIS managers, 119-20; profile of a typical end user using an information center, 118-19; profile of a typical IC professional, 117-18; redefining the job of IC professionals, 120-22
- FCS decision-support package, 82
 Feedback, 175
 Feeney, William, 111
 Financial spreadsheet, 204
 First National Bank of Boston, 226
 FOCUS, 8, 144
 Forcing, 241-42
 Fortune 1000, 120, 141, 209
 Forward-looking approach, 239
 Fourth- and fifth-generation languages, 61, 66
- General Electric, 227
 GIGO principle, 167
 Graphics, 39, 66
- Hadass, Michael, 111
 Hardware and software integration: introduction to, 60
 Holmes, Thomas H., 93
 Honeywell, 223, 227
- IBM, 6, 8, 28-29, 38, 195, 204
 IBM Information Network, 8
 IBM PCs, 14, 36, 38, 100, 115, 195, 220, 223, 226-28, 234, 250

- IBM's Presentation Graphics Facility, 8
- IBM's Structured Query Language/Data System, 8
- IC consultants, 227-29, 247-48
- IC facilitators, 227-29
- IFPS, 8, 73
- Imposer, 94-95
- Individual Software, 143
- Info-Dyne, 27
- Information: corporate asset, 4-5; new ways to use the corporate asset, 5-6
- Information center manager: duties of, 220-21; professionalism of, 221; selection, 219-20
- Information center professionals as change agents, 96
- Information center questionnaire: control and security over information centers, 177-81; development of, 40-44; hardware and software integration, 71-74; major sections, 42; organization of information centers, 103-5; planning an overall strategy for information centers, 44-47; purpose of, 41-42; recommendations from, 42-44; staffing of information centers, 125-28; training of end users, 153-55
- Information centers: active supportive approach, 176-77; applications that should be viable candidates, 9; charge-back system approach, 175-76; control problems over ICs and microcomputers, 181; corporate culture, 115-17; development of budgets, 40; development of questionnaire, 40-44; difficulties with, 10; establishment of an information center steering committee, 218-19; evaluation of control problems over ICs and microcomputers, 181-84; introduction to, 4; introduction to planning an overall strategy, 24; introduction to their organization, 90; justifying existence of, 175-77; members of an information center steering committee, 218-19; nature and direction, 6-7; overall strategy, 199-200; overview, 6; planning an overall strategy, 26-32; planning for coming year, 38-40; recommendations to improve control over information centers and microcomputers, 184-86; relationship to management information systems, 8-9; staffing of, 114-34; survey, 38-40; training, 229-30; typical examples, 7-8; use of data base management system, 206-9
- Information retrieval method, 39
- Integrated software, 39
- INTELLECT, 8, 29, 73
- Keen, Peter, 194
- Kennen Publishing, 143
- Kolodziej, Stan, 161
- Lasden, Martin, 211
- Leadership, 211
- Lewin, K., 121
- Lewin-Schein model, 121-22
- Linear programming, 205
- Lisa, 245
- Local area network, 204
- Lotus Development Corporation, 61
- Lotus 1-2-3, 49, 61, 68, 75, 83, 204, 220, 226, 245
- McDonald, 115
- McGraw-Hill Training Programs, 144
- Management-by-objectives (MBO), 148, 239-40
- Management guidelines for corporate management to integrate interests: areas of concern for acquiring microcomputer systems, 202; do's and don'ts of corporate policies and procedures, 196-98; eight management guidelines for corporate management to integrate interests, 198-211; establishment of an effective working relationship between IC professionals and end users starts with corporate management, 193; establishment of corporate policies and procedures, 194-95; establishment of responsibility

- and control over microcomputers, 207-9; establishment of standards for microcomputer security, 209-10; implementation of corporate policies and procedures, 195-96; integration of corporate databases between mainframe and microcomputers, 206-7; introduction to, 192; major microcomputer challenges, 194; methods to overcome microcomputer system incompatibility, 202-4; micro-mainframe link for data compatibility, 204-5; overall strategy for successful information centers, 199-200; top-down approach that ties in with information centers, 200-202; utilization of management guidelines for integrating interests of IC professionals and end users, 210-211; working out a strategy for corporate management to integrate interests, 193-98
- Management guidelines related to end users: active participation in end-user group meetings, 249-50; active participation in end-user training, 248-49; active participation in the development of computer applications, 245-47; computing control process, 251-52; eight management guidelines related to end users, 242-53; establishment of obtainable computing goals for end users, 239-40; establishment of ownership in the information centers, 243; IC professionals acting as change agents, 247-48; insurance considerations, 252; introduction to, 238; need of, 238-39; provision of input on acquiring computer hardware and software, 243-45; relating computing goals to critical success factors, 240; relationship of management guidelines for end users to IC professionals, 252-53; resolution of conflict between IC professionals and end users, 240-42; two-way communication on current computing problems, 249
- Management guidelines related to IC professionals: acting as knowledgeable consultants to end users, 227-29; assignment of responsibility for the information center support services and maintenance, 225-27; eight management guidelines related to IC professionals, 221-34; establishment of an effective end-user group with periodic meetings, 231-32; establishment of an information steering committee, 218-19; establishment of control over end-user computing, 232-34; improvement of the communication process with end users, 230-31; introduction to, 216; involvement in acquiring appropriate computer hardware and software, 222-25; management of IC professionals by MIS department, 217-18; need of, 216-18; provision of desired training for end users, 229-30; relationship of management guidelines for IC professionals to end users, 234; selection of competent information center manager, 219-21; utilization of a proactive approach that is related to a stated micro policy, 222
- Massachusetts Institute of Technology, 194
- MBA, 221
- Merrill Lynch, 7
- Microcomputers: current uses, 61; future capabilities, 62-63; justification and selection, 63-64; integration of hardware and software planning, 70-71; micro to micro, 204; planning by information centers for end users, 63-66; procurement, implementation, and support, 64-66; relationship to productivity, 62; security, 209-10, 233-34; super-market, 202; utilization to improve productivity, 61-63
- Microcomputer Managers Association (MMA), 221
- Micro DBMS, 39
- Micro FCS, 82-83

- Micro-mainframe connection, 205
- Microsoft, Inc., 61
- Micro software: integration of hardware and software planning, 70-71; planning by information centers for end users, 66-69; software considerations, 67-68; software vendor packages, 68-69
- Micro VAX, 28
- MIS backlog, increasing, 26-27
- MIS control approach to data security and data integrity: current IC control approach, 168-72; data integrity measures, 171-72; data security measures, 170; IC management guidelines to improve control, 174; importance of IC education to improve control, 172-74; introduction to, 168; problems with the current control approach, 169; procedures to overcome current control problems, 169-72
- MIS executive steering committee, 91
- MIS/IC operating plan, 200-202
- MIS project, 91-92
- Mission, defined, 199
- Mouse, 245
- Moving, 122
- Multiplan, 61
- Nestar Systems, Inc., 204
- Neumann, Seev, 111
- Newton-Evans Research Company (NERC), 209-10
- Northrop, 8
- Objective, defined, 199
- Organizational model for MIS development, 91-92
- Organization models of information centers: difficulties with, 100; effective model to overcome difficulties, 101-2; formal structures, 101-2; informal structures, 101-2; introduction to, 97-98; large organization, 98-99; medium organization, 98-99; overlooked factors for an effective model, 101-2; small organization, 98
- Organizational roles to assist end users: introduction to, 92; DDP consultants to assist end users at remote sites, 92-93; DSS coordinators to assist end users at home office and remote sites, 95-96; systems analysts as DSS change agents, 93-95
- Organization structure: assist end users by MIS management, 90-91; end-user review group, 91; introduction to the organization of an effective information center, 90; MIS executive steering committee, 91; MIS project team, 91-92; model for MIS development, 91-92
- Osborne portables, 14
- PASCAL, 35
- Passwords, 170
- PCOX package, 220-21
- People resource, 177-78
- Persuader, 94-95
- PERT, 205
- Planning an overall strategy for information centers: development of objectives for information centers, 29-30; flexibility to meet changing times, 31-32; increasing MIS backlog, 26-27; integration of MIS department with information centers, 28-29; linkage of desired IC plans and IC organization with control, 166-67; relationship of overall strategy to productivity, 27-28; utilization of a phased approach over time, 30-31
- Planning of microcomputers by information centers for end users: integration of hardware and software planning by information centers, 70-71; introduction to, 63; micro justification and selection, 63-64; micro procurement, implementation, and support, 64-66
- Planning of micro software by information centers for end users: integration of hardware and software planning by information centers,

- 70-71; introduction to, 66-67; software considerations, 67-68; software vendor packages, 68-69
- Plug-compatible mainframe (PCM), 39
- Proactive approach, 100, 222
- Procter & Gamble, 115
- Product integration, 151
- Productivity: utilization of microcomputers, 61-63
- Radio Shack TRS-80 (IIs), 14
- RCA, 227
- Reactive approach, 100
- Redefining the job of IC professionals:
 - introduction to, 120-21; use of IC professionals as change agents, 121-22
- Refreezing, 122
- Report generators, 66
- Resolution of conflict between IC professionals and end users: approaches to reducing computer conflict, 241-42; compromising, 241-42; confronting, 241-42; forcing, 241-42; introduction to, 240-41; smoothing, 241-42; withdrawing, 241-42
- Rhodes, Wayne L., Jr., 56
- Robert Half International, Inc., 120
- Safeware, The Insurance Agency, Inc., 252
- SAS, 73, 144, 231-32
- SAS/GRAPH, 8
- Schein, E. H., 121, 135
- Sign-on logs, 170
- Sladek, Frea, 111
- Smoothing, 241-42
- SNA Gateway, 29
- Special-interest groups (SIG), 250
- Spreadsheet software, 61, 66
- Staffing of information centers: assessing the expertise of organizational personnel, 117-20; how not to staff the information center, 124-25; how to staff the information center, 123-24; introduction to, 114; overall considerations for getting started, 115-17; recommendations to improve information center staffing, 133-34; redefining the job of IC professionals, 120-22; selecting appropriate IC professionals, 122-25
- Stanford University, 221
- STAR, 245
- Strategy, defined, 199
- SuperCalc spreadsheets, 14
- Systems integration, 152
- Tandy, 228
- 3M, 115
- Time, Inc., 220-21
- Tower of Babel, 166, 209
- Training of end users using information centers: approaches to computer-based training, 143-44; approaches to delivering computer-based training, 144-46; continuing developments of IC training over time, 150-51; developments of an effective in-house IC training programs, 146-50; evaluation of computer-based training problems, 157-59; guidelines for selecting computer-based training software, 141-43; introduction to, 140-41; recommendations to improve information center training, 159-60; three-stage IC training development process, 151-53; training of microcomputer end users, 159-60
- Tratec, 144
- TRS-80, 14, 34-35, 226
- TRW's Customer Service Division, 227
- Unfreezing, 121
- University of Washington, 93
- UNIX, 34, 100
- Upgrade the skills and capabilities of IC professionals, 152-53
- Vendor checklist, 202
- Video journals, 144
- Windows, 245
- Withdrawing, 241-42
- Word processing, 39, 61, 66
- Xerox Corporation, 227, 245

ABOUT THE AUTHOR

ROBERT J. THIERAUF is a Professor of Information and Decision Sciences at Xavier University; he also served as chairman of the Department of Management. Throughout his career he has worked in industry performing audits and consulting. He is the author of 19 books, many of which have been translated into other languages including Spanish, German, Russian, and Japanese. He is a member of the Academy of Management, the American Institute of Certified Public Accountants, the Institute of Management Science, the Decision Sciences Institute, and the Association for Computing Machinery.